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No. 9.— *Dogs of the American Aborigines.*

BY GLOVER M. ALLEN.

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INTRODUCTION.

WHEN Columbus, in 1492, made his discovery of land in the Western Hemisphere, he found it already peopled by a race of men who are considered by modern ethnologists to be of Asiatic origin, and probably of an antiquity dating back not many thousands of years. Yet these aboriginal peoples were considerably diversified as to appearance, language, and customs. In South America, the Incas had domesticated animals, llamas and alpacas, whose wild progenitors are the last

remnant of the once diverse phylum of American camels. There is no good evidence, however, that the horse which survived in North America till late Pleistocene times was ever known to the aborigines until its reintroduction by Europeans. Dogs they had, nevertheless, universally and in some variety. Yet at this late date it is hardly possible to define the various breeds or variations with any exactness or to throw much light on the question of their ultimate origin. An attempt is made here to gather what information the earlier travellers recorded as to the appearance of the dogs of the American aborigines, and so far as may be, to characterize the various breeds that can be distinguished.

A bibliography is added giving the more important papers on the origin of the dog, and on prehistoric dogs of the Old World, as well as references to the aboriginal dogs of America.

ACKNOWLEDGEMENTS.

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For interesting photographs of dogs, thanks are gratefully extended to Messrs. Ernest Harold Baynes, W. B. Cabot, C. T. Currelly, W. C. Farrabee, S. J. Guernsey, the Royal Ontario Museum of Archaeology, and the American Genetic Association.

ORIGIN OF THE DOMESTIC DOG.

The problem of discovering the wild ancestor of the Domestic Dog has engrossed the attention of naturalists from the time of Buffon to the present. Basing their opinion on general external resemblances, the early systematists, *Güldenstadt* and *Pallas*, favored the Indian Jackal as the primitive stock whence the European dogs were derived. In this course they have been followed by many later writers, but more exact studies (*Miller*, 1912) show that the teeth of the Jackal may be

distinguished by many minor characters (such as the broadly continuous outer cingulum on m^2 and m^3) from those of the Wolf and Dog. Gidley (1913) has illustrated more fully some of the distinguishing tooth-characters of several canids, including fox, wolf, and coyote, and has grouped them into a key, from which it is seen that domestic dogs and wolves are essentially alike in the cusp-characters and proportions of their teeth, and differ from coyotes and foxes in average characters which though slight, are appreciable on direct comparison. Miller (1912, p. 313) concludes that in a series of dog-skulls "representing such different breeds as the pug, fox-terrier, bloodhound, mastiff, ancient Egyptian, ancient Peruvian, Eskimo (Greenland and Alaska) and American Indian, the teeth are strictly of the wolf type"; and this assertion I can fully endorse from a study of these and other breeds. Nevertheless, though the Wolf and the Domestic Dog are closely related, it does not follow that the latter is directly derived from the former, though even as lately as 1911, Trouessart has upheld the view first put forth by Jeitteles (1877), that the Indian Wolf (*Canis pallipes*) might be the ultimate source of certain breeds of the Dog. Studer (1906) suggests some large Dingo-like type as the lost ancestor; while Noack (1907) supposes that the original stock may have been identical with a small Chinese Wolf of which he possessed two specimens from Tchili, regarded as like the Dingo in color. Nehring (1887) suggests that a small Japanese Wolf (*C. japonicus*) is the living ancestor of the Japanese Street-dog. The Dingo itself is of doubtful origin, and though probably a relatively recent arrival in Australia, may have been brought at the time the Continent was first peopled by man. Krefft (1866) believes he has identified its "first molar tooth. . . . with other fossil remains in the breccia of the Wellington caves," while McCoy (1862) has "identified its bones mingled with those of recent and extinct animals all in one state of preservation in the bone-caverns recently opened beneath the basalt flows at Mount Macedon." In New Zealand, domestic dog-remains of a different breed are found associated with those of the extinct giant rails in the kitchen-middens and presumably came with the Maoris (Hutton, 1898).

The older naturalists maintained the view that cross fertility was a test of specific identity, and recorded many cases in support of the contention that the Dog was fertile with Wolf and Jackal, and that hence it was of such mixed ancestry. Thus, Hunter (1787) recorded the fertile cross between a male Dog and a female of the Wolf and of the Jackal, whence he concluded that all were of one species. A more

recent investigator, (Kühn, 1887) records the fertility of Dog-Jackal hybrids when crossed *inter se* or back crossed. In this case a female Finnish Bird-dog was bred to a captive Indian Jackal (*Canis aureus indicus*), producing three litters of four each. All the young were much alike in appearance resembling the Jackal, but were somewhat darker in color. One of the hybrids bred to a Siberian Dog produced seven young. Two other of the original hybrids were paired together, and produced a litter of three young after a period of sixty days' gestation — the normal time for a dog. These young were darker than their parents, with a wash of golden along the sides and on the head, recalling the Jackal's color. Unfortunately no careful study of the cranial and dental characters in the hybrids was made.

The crossing of Wolf and Dog has been frequently accomplished in captivity (Hunter, 1787, 1789). An instance of the fertile crossing of a Siberian Sledge-dog with a female Dingo from Australia is recorded by Eiffe (1909). The North American Indians and the Eskimo are accredited with tethering female dogs in heat at a distance from camps to obtain crosses with wild wolves, which though usually highly hostile to dogs, will at such times, it is said, hybridize. According to Coues (1873) and others, similar methods were used by the American Indians of the Plains to obtain crosses with wild coyotes. Yet the evidence is not altogether convincing that such cross-breeding was very general, or that it has modified the native dogs in any way. It is noteworthy that the American Indian is not given to the domestication of Wolf or Coyote puppies as might be expected if either were the prototype of his Dogs. Nevertheless Coues (1873) and Packard (1885) on the ground of general external appearance have held that the common Indian Dog of North America was merely a tamed Coyote; and their view has gained wide credence. It may be confidently stated, however, from a study of skulls and teeth, that this is not at all the case. Packard was perhaps influenced by Cope's (1883, p. 242) statement that "many of the domesticated dogs have been derived" from the Wolf and the Coyote, as found in the Pliocene deposits of the Republican River formations. The American Indian dogs, however, are true domestic dogs in skull-characters, and show no evidence of derivation from coyotes.

Crosses between domestic dogs and foxes have been less commonly reported, and even these reports seem to lack proper substantiation in most cases. B. Ross (1861) explicitly states that the dogs of the northern Indians could not be induced to cross with captive foxes. A supposed case is given by Toni (1897) of a natural hybrid, but its ancestry as in one or two other cases, was merely conjectural.

While some naturalists have thus sought to derive the Domestic Dog from Wolf, Jackal, Coyote, or Fox, or from a mixture of two or three of these, others have maintained that it is quite as well entitled to be considered a distinct species with its various artificial breeds. Buffon was one of the first to support this view. Pictet (1853, 1, p. 203-210) believed that dog-remains from cave-deposits in Europe probably represented the wild ancestor of domestic dogs, and to this wild species he gave the name *Canis familiaris fossilis*. In this he was followed by Bourguignat (1875) who regarded the Prehistoric Dog as a species, related to the Wolf but coexistent with it in a wild state. He applied to it the name *Canis ferus*, and concluded from the relative scarcity of its remains in the earlier strata of human culture, that it was at first seldom domesticated by the early cave-men. Remains of Pliocene canids from central France have been suggested by Boule (1889) as representing the progenitors of the Domestic Dog.

Although the recent and more exact studies of Miller (1912, p. 313) and Gidley (1913, p. 99) have shown that the Domestic Dog may be distinguished by dental characters from Coyote, Jackal, and Fox, its close relationship to the wolves is shown, as they point out, by the shorter and narrower heel of the lower carnassial in proportion to the length and width of the remaining part, the general bluntness and plumpness of the premolar and molar teeth and their cusps, as well as by the shorter and blunter canines. Other less constant but average distinctions are tabulated by the latter author. A noticeable character of the lower tooth-row in Wolf and Dog may also be mentioned, namely, its distinctly outward bend at the junction of the molar and premolar series, whereas in the Coyote and the Jackal, the axis of the tooth-row is much more nearly a straight line. The presence of a minute second posterior cusp in addition to the cingulum in the fourth lower premolar is characteristic of Jackal and Coyote.

The relationship of the Domestic Dog having thus been found to be wholly with the Wolf, and not with Jackal, or Coyote, it remains for future investigation to show what wolf-like ancestor was its wild progenitor. This, however, lies outside the scope of the present paper. Yet it may be said that no evidence has hitherto been adduced that clearly indicates the origin of the Dog from any of the large wolves of circumboreal distribution. In general the skull of the Dog is at once distinguished from that of the Wolf, apart from its usually smaller size, by the higher forehead of the former. That this, however, is due to greater development of the cerebrum through domestication has been suggested by Hammeran (1895), notwith-

standing that domestication in case of most animals seems rather to have a stultifying effect. A more diagnostic character is found in the size of the teeth, which even in the largest breeds of dogs are considerably smaller than in the wolves. A fact of probable significance is that in wolves as in the less modified breeds of dogs, *e. g.*, the American Indian dogs, the free posterior border of the palate ends about on a line passing transversely through the middle of the last molar. In the large breeds of European dogs a transverse line at the hinder margin of the palate usually falls considerably behind the last molar, indicating probably that the teeth have retained more nearly their original size relations than have the maxillary and other bones. A like condition is seen also in dogs in which the teeth are abnormally reduced in size, due probably, as in case of the Chinese Chow Dog, to a diet of soft foods as rice and fish through many generations. These facts tend to indicate that the Dog and the large Wolf are really distinct species, and that the wild progenitor of the Dog was a small Wolf of a species distinct from the large wolves of circumboreal distribution. It is natural to look to Asia for this unknown ancestor, and it would be valuable if the studies of Noack and Nehring as to the small wolves of Tchili and Japan might be more fully confirmed. Jentink (1897) suggests the Wild Dog of Java as a representative of the original stock whence the Domestic Dog sprang.

Attention should here be called to the possible effect of domestication in reducing the size and proportions of the Wolf. Apparently the only investigator to compare the skulls of wolves born in captivity with those of wild individuals is Wolfgramm (1894), who states that the skulls of the captive-born wolves are smaller in all proportions, broader and higher, with less developed muscle-crests. The snout is so shortened that pm^4 is forced to assume a transverse position, the lower premolars are imbricate, while in size the carnassial as well as the other teeth are said to be slightly reduced. Wolfgramm concludes that this is sufficient proof that the Dog is derived from the European Wolf, and that its smaller size is a direct result of its domestication. The facts, however, do not warrant such a conclusion. The reduced size of the skull and the crowding of the teeth in captive-born wolves are probably a result of improper nutrition during growth and lack of exercise under confinement, conditions wholly different from the free life of a dog under domestication. The crowding of the premolars is quite as abnormal for a dog as for a wolf, and occurs through failure of the maxillary bones to attain their proper growth, while the teeth themselves attain their size independently.

While some authors have considered that modern dogs are polyphyletic, and would trace the ancestry of the larger breeds to wolves and of the smaller to foxes (Woldrich, 1886a, even suggests the Fennec!), it seems more reasonable to derive them all from a medium-sized dog through selective breeding. Nevertheless it is possible to divide modern breeds into some four to six groups, based mainly on size and minor external characters as erect or lop-ears, drooping or curled-up tail, etc. Cuvier (1808) believed that the French Sheep-dog approached the wild prototype most nearly of all domestic breeds, and considered the Australian Dingo as the most primitive true dog. The characters considered primitive are chiefly the medium size, the erect, wolf-like ears, unshortened snout, drooping and moderately haired tail, and low forehead. The ability to bark is often considered an acquired trait; and the more primitive dogs, such as the Eskimo, howl like wolves more than they bark.

Historic evidence as to the ancestry of the Dog does not carry the matter far enough. The Egyptians had dogs as far back as the records go — certainly four to five thousand years before the Christian era. The same is apparently true of the Chinese, whose history goes back nearly as far. Lortet and Gaillard (1909) recognize four breeds of dogs among the mummified remains from Assiout. Fitzinger (1866) has summarized the ancient history of dogs known from the earliest writings of Rome, Greece, Assyria, and Egypt. Yet it is clear that at the dawn of history, the nations of Europe, Asia, and North Africa had dogs of several breeds, more or less characteristic of each people. Thus the Greyhound type seems especially prevalent in Egypt and is to this day associated with the desert-loving races of Persia and northern Africa.

European archaeologists have made many discoveries of dog-remains in association with bones and implements of prehistoric man, particularly in the caves and old Lake-dwellings of southern Europe. Hitherto at least eleven different Latin names have been applied to as many supposedly distinct prehistoric dogs of Europe. Anutschin (1881) announced the discovery of the first dog-remains to be found in Russia. Parts of fourteen dog-skeletons were found in building the Ladoga Canal, and represent two types which he names respectively *Canis familiaris palustris ladogensis*, and *C. f. inostranzewii*. He considers these to be of the Stone Age, and that the former is closely allied to the Siberian and Northwest American Sledge-dogs — (Eskimo). The latter he thinks very similar to the *C. matris-optimae*, a deerhound-like type, from the Bronze Age, or even earlier (Neolithic,

according to Nehring, 1883). Dog-remains, associated with a human skeleton and palaeolithic implements, were described by Studer (1906) as *Canis poutiatini*, and were discovered while digging a street near Gute Bologoie in Russia. This was as large as a medium-sized Sheep-dog and is believed by this author to be the fore-runner of *C. intermedius* of the Bronze Age, which is possibly a hound.

In the Swiss Lake-dwellings occur skulls of a smaller type of dog named by Rüttimeyer *Canis palustris*, a breed characteristic of the later Neolithic and the Bronze Ages, in Europe, 5,000 to 7,000 years ago. Another Neolithic Dog of small size (skull length, 158 mm.) is described by Hué (1906) from Clairvaux, Jura, as *Canis le mirei*, while still another of dwarf proportions, *C. mikii*, is considered by Studer (1906) as a fore-runner of *C. palustris*. The same author (Studer, 1901) sees much resemblance between skulls of *C. palustris* and those of Chow and Spitz. Undoubtedly the Chow is a rather ancient type, in many ways recalling the Eskimo Dog in its erect short ears, broad muzzle, small eyes, bushy mane, and curled-up tail carried stiffly over the hip. Measurements of skulls of Chows given by Studer are slightly larger than those of *C. palustris*.

No less than four breeds of dogs are recognized by Strobel (1880) in human culture layers transitional from the Neolithic to the Bronze Age in Emilia, Italy. One is the small *C. palustris* wide-spread in the Stone Age of Europe; the second is *C. intermedius*, a larger dog supposed to be a hound; the third is the larger *C. matris-optimae*, regarded by Studer (1901) as of the Collie and Sheep-dog (Wolf-dog) type, while the fourth is a Dog smaller than *palustris*, and believed to be of a distinct breed which Strobel names *C. spaletti*. Remains of the first three of these breeds are recognized by Woldrich (1898) from culture layers of middle Neolithic times in caverns of Bohemia.

From these brief accounts of discoveries of prehistoric dogs it is clear that at a very early period of human culture there were at least two or three types under domestication in Europe. It need not be supposed, as some authors have done, that these types are of local origin. Europe, as a peninsula of Asia, probably received its dogs as well as its human population in part at least from the East. Possibly then, as now, certain breeds of dogs were characteristic of different invading tribes.

ORIGIN OF AMERICAN DOGS.

Very little attention has been paid to the dogs of the American Aborigines. At the present day it is probably too late to find pure-bred examples of most of the local varieties that formerly occurred. Barton (1805) was about the only American naturalist to give much thought to the matter, but the few notes he collected were taken mostly at second-hand and were rather indefinite. Coues, Cope, and Packard, as well as many writers following them, considered that the domestic dogs of America must have been derived from the Coyote, or from some other indigenous species of North or South America. Cope was the only one who made an examination of the teeth. In a fragment of a lower jaw from Florida, Cope (1893) made particular note of the absence of the first premolar and remarked on the large size of the metaconid and the entoconid of the lower carnassial. It is true that in a large percentage of American native dogs the first premolar is absent from the lower jaw. A similar anomaly is occasionally seen in wolves and in European dogs, but is rare. It is usually considered that the first premolar in dogs is without a milk predecessor, but though this is often true, it is not always the case. A jaw of a very young dog in the Museum collection, shows very small milk-teeth capping the permanent first premolars which are nearly erupted. A similar case is reported by Lataste (1888). The entire suppression of the first premolar, particularly in the lower jaw, in a large percentage of American dogs, is possibly a retention of the usual early condition, in which there is no first milk premolar.

The important paper of Loomis and Young (1912) and the reports of Nehring on dogs from ancient Peruvian burials comprise most of the work that has been done in the comparative dental and osteological study of American dogs. There are, however, brief notices of the discovery of prehistoric dog-remains and early accounts of certain native dogs by travellers, the more important of which are included in the Bibliography (p. 504-517). Miller (1912) seems to have been the first to show that the teeth of American aboriginal dogs are those of true dogs rather than of coyotes or wolves. This I have verified from a considerable mass of material from North America and Peru, so that there can be no question but that the domestic dogs of both Old and New Worlds are closely related and of common ancestry. It follows that instead of having domesticated various dog- or fox-like species of the American continents, the peoples of the New World

must have brought their dogs with them, presumably from Asia, and this probably at a culture stage prior to the domestication of other animals, at least in the North, since no other domestic animal is common to the peoples of both hemispheres. The Asiatic origin of American dogs has previously been suggested by Mercer (1897, p. 126) and Wissler (1917).

The probability therefore is, that the Domestic Dog originated in Asia and was carried by primitive man both east and west into all parts of the inhabited world. That this migration began in late Pleistocene times seems highly probable.

In the Western Hemisphere three types of dogs may in a very general way be distinguished:— (1) the large wolf-like Eskimo Dog of the Arctic countries, strong, powerfully built, with broad muzzle, erect ears, and large bushy tail curled forward over the hip; (2) a smaller type, varying more or less in size and proportions, with erect ears but a drooping tail; and (3) a much smaller type, the size of a terrier, heavy of bone, usually with shortened rostrum as seen among the tribes of the Southwest or again, apparently more slender both in limb and skull as in southern Mexico or parts of South America. South of the Eskimo country, the two latter types of dogs are characteristic, and seem to have occurred together over much of their range, so that travellers often mentioned a "wolf-like" and a "fox-like" dog among the Indians of both North and South America. In this connection, it is interesting to recall Köhler's (1896) statement that in eastern Asia, between the provinces of Gansing and Ussuri, the Chinese have small fox-like dogs, a comparison of which with the small American dogs would be of interest. The smaller American dogs of the slender type (Techichi) seem not very different from the Old World *C. palustris*, and may be not remotely related. The more heavily built small dogs with shortened faces and shorter, stouter limb-bones, are perhaps derived from the more slender type, and possibly owe certain of their peculiarities to cross-breeding with the larger dogs, though this is at present wholly conjectural.

BREEDS OF AMERICAN ABORIGINAL DOGS.

While in a very general way it may be said, that excluding the Eskimo Dog, the American Indians had domestic dogs of two chief types, a larger and a smaller, there were apparently sundry local breeds of these, probably conforming in distribution with the general areas

occupied by the groups of tribes amongst which they were found. In the following pages an attempt is made to define such of these breeds as seem to be indicated by the fragmentary accounts of travellers as well as by the study of what skeletal remains have been available. No doubt the number of breeds recognized is subject to revision, for it has been found difficult to determine with any approach to certainty in some cases, what external and skeletal characters are to be associated, and in how far certain supposed breeds are mongrel or relatively pure. Again, the skeletal characters may frequently fail to give any clue to external traits that would be distinctive. Moreover, while the term "breed" is applied to these locally distinct forms of dogs, it is not assumed that the American natives made any conscious effort to change or keep constant the traits of their dogs; possibly some of the variations are merely the result of a certain mongrel mating, going on quite independent of human intent, so that, as in case of the Peruvian Pug-nosed Dog, the variation cropped out only occasionally and may or may not have been purposely preserved.

Nomenclature.—The bestowal of Latin names upon the different breeds of dogs recognized has here been purposely avoided, as it seems unwise to extend to such artificial variations the systematic recognition accorded natural species and subspecies. Nevertheless, Latin names or Greek letters have been used by other writers to indicate domestic breeds, and such names have been applied in many ways:—as trinomials, quadrimomials, or quinquenomials; sometimes separated from the binomial, *Canis familiaris*, by a comma or the abbreviation "var.," or otherwise used in such a way as to cause doubt as to their technical standing in systematic nomenclature. Some names of dogs have been erected in a strictly binomial fashion and if accorded standing, conflict with other names. Thus Rütimeyer's *Canis palustris* (1863) of the Lake-dwellings is preoccupied by von Meyer's *Canis* (= *Galecynus*) *palustris* (1843). The name *Canis mexicanus* currently used for the Mexican Wolf proves to apply to the Mexican Hairless Dog only. Hodgson's *Canis laniger* (1845) for a Thibetan Wolf is preoccupied by Hamilton Smith's *Canis laniger* (1840) for the Nootka Sound Dog. Other cases might be added. The practice of using standard English (or vulgar) names for all artificial breeds is therefore to be recommended. With the descriptions following, a list of Latin names applied by previous writers is given under each breed.

ESKIMO DOG.

Plate 1, fig. 1.

1817. *Canis familiaris sibiricus groenlandicus* Walther, Hund, p. 27 (*fide* Fitzinger; not *Canis groenlandicus* Bechstein, 1799, *q. e.* Alopex).
 1820. *C. f.* var. *n. borealis* Desmarest, Mamm., 1, p. 194.
 1840. *Canis borealis* Hamilton Smith, Jardine's Nat. library. Mammalia, 10, p. 127, pl. 2.

Characters.—Size large, appearance wolf-like, but with less oblique eyes, less attenuated muzzle, and more elevated forehead; tall usually carried curled forward over the hip: teeth much smaller than those of the Wolf. Pelage thick, with a shorter under fur overlaid with longer hair which on the shoulders may be as much as eight inches long; tail bushy. Color whitish, more or less clouded on the back, with dusky, or varying to black, or black and white, or rarely tan and white.

Distribution.—The Eskimo Dog was originally found in Arctic America coextensively with the Eskimo tribes from the barrens of Alaska to Labrador, chiefly along the coast. In the east it was probably at its southern limit on the east coast of Newfoundland, and thence ranged northward, accompanying its Eskimo masters, to Smith Sound, Greenland. In Greenland it formerly was found along the west coast southward, with the natives, but the present-day sledge-dogs of the Danish settlements are probably largely mongrel, through interbreeding with dogs introduced from Europe (Brown, 1875); and the same is true of those in Alaska and southern Labrador.

External Measurements.—An Eskimo Dog brought back by Parry, on his first voyage, is figured by Children (1827) who gives its dimensions as follows:—

Length, occiput to root of tail	28 inches	about 71	cm.
“ “ “ end of nose	11 “	“ 28	“
“ of tail (about)	18 “	“ 45.7	“
Total length (therefore about)	57 “	“ 145	“
Length of ear	3 “	“ 7.7	“
Eyes to point of nose	4 “	“ 10	“
Standing height at shoulder	24 “	“ 61	“

These figures do not indicate a very large animal. The very thick coat, especially on the shoulders, gives an increased appearance of size not well borne out by skeletal measurements. It should be kept in mind, that since the advent of Europeans, much attention has been

given to increasing the size and strength of these northern dogs for draught purposes. It is likely that the large wolf-like Eskimo Dogs now common in the North, are considerably different from the original stock found by the early Arctic explorers.

Figures. Children, J. G. Zool. journ., 1827, **3**, pl. 1. From Parry's first voyage.

Audubon, J. J. and Bachman, J. Quadrupeds of North America, 1848, **3**, pl. 113. Zoölogical Gardens, London.

Smith, C. Hamilton. Jardine's Nat. library. Mammalia, 1840, **10**, pl. 2. Prince's Street Gardens, Edinburgh.

Cranial Characters.— Among the various skulls of so-called Eskimo Dogs examined, there is more or less disparity of size. This is no doubt an indication of the extensive crossing with European dogs that has been carried on for a long period with a view to improving the speed and strength for which this dog is useful. Skulls from eastern Kamtschatka are small, others from Alaska and Mackenzie are of superior size. It is therefore difficult at the outset to determine what the original Eskimo Dog of North America was really like. It is notable, however, that the teeth, even of the largest skulls are not much larger than those of medium-sized skulls, while in no case do they approach the magnitude of the Wolf's teeth. It would be of the utmost interest, in this connection, to compare the teeth of a known hybrid between the Eskimo Dog and a Wolf. Yet in spite of the frequency with which this cross is said to occur, there seem to be few skulls available. Windle and Humphreys (1890, p. 9) give the ratios of different parts of such a skull to the basicranial axis.

For lack of a more authentic standard, I have taken as typical of the Eskimo Dog, portions of a skull (M. C. Z. 10,537–10,539) exhumed by Dr. M. P. Porsild from an old village site at Sermermiut, west Greenland. While not of great size, this skull is notable for its broad palate, rather prominent trough-like depression between the frontals, and the high strong sagittal crest, yet is the surface of the brain-case comparatively smooth. Nearly similar is the skull of an Eskimo Dog from Hebron, Labrador, collected in 1897. Its wide palate and stout teeth are particularly noticeable as well as its strongly developed crests and broad forehead.

Measurements of the Skulls	M. C. Z. 10,538 Greenland	M. C. Z. 7,406 Labrador	U. S. N. M. 83,869 Baffin Land
Upper tooth-row, alveolus of i^1 to m^2	95	105	96
“ “ “ “ c to m^2	81	87	79
“ “ “ “ p^1 to m^2	68	66	66
“ “ “ “ p^2 to m^2	62	59	58
“ “ “ “ m^1 to m^2	19	19.5	19
Length of carnassial, p^4	19.5	21	21
Width of palate outside m^1	75	75	69
Palatal length, alveolus of i^1 to median edge	98	?	94
Lower jaw, alveolus of i_1 to m_3	97	105	—
“ “ “ “ c to m_3	89	99	—
“ “ “ “ p_1 to m_3	—	—	—
“ “ “ “ p_2 to m_3	72	74	—
“ “ “ “ p_3 to m_3	61	62	—
“ “ “ “ p_4 to m_3	50	49	—
“ “ “ “ m_1 to m_3	37	37	—
Length of carnassial, m_1	22	23.6	—
Width across postorbital processes	64—	52	52
“ “ zygomata	125	—	—
“ “ occipital condyles	45	49	43

Nathusius (1874) reports on ten skulls found near old Eskimo huts in Jackson and Sabine Islands, Greenland. The largest of these had a basal length of 189 mm., the smallest 175 mm. In skull U. S. N. M. 83,869 the basal length is 170 mm., the condylobasal length 180 mm., which may be the same dimension as the “basal length” of Nathusius.

In a series of nine skulls of Eskimo Dogs from Greenland, Baffin Land, Labrador, Mackenzie, Alaska, eastern Siberia and Kamtschatka, collected for the most part many years ago, it is notable that most are of about the same size as those of the Common Indian Dog. One or two from eastern Siberia are the smallest and most slender. All are heavy of bone, yet the sagittal crest does not show the strong backward overhang seen in the Wolf's skull. The muzzle in most is broad, yet this varies. The largest skull of all (U. S. N. M. 8,222) collected by Dr. W. H. Dall at Nulato, Alaska, is nearly as long as a small Wolf's, yet the teeth do not approach those of a Wolf in size. This and other large skulls of Eskimo Dogs, probably are the result of crossing with large dogs of European origin. Hearne (1796) speaks

of the large English dogs at the Fort on Hudson Bay; Ross (1861) notes the crossing of Eskimo Dogs with imported Pointers; and Harmon (1820) records that by the early part of the last century, large dogs imported from the English settlements of Newfoundland, had already been introduced in the fur countries as far west as the Rocky Mountains. It seems apparent that the large size of some present-day Eskimo Dogs is therefore due to the influence of imported stock, and that probably the aboriginal Eskimo Dog was not a much larger animal than the Common Indian Dog. The thick coat, however, often adds much to its apparent size.

It seems to be somewhat characteristic of the Eskimo Dog that the posterior narial opening (interpterygoid fossa) is broader and shallower, less contracted at its rearmost portion, than in dogs of other breeds, possibly correlated with their use in hauling and consequent need for deeper breathing. In this respect, however, there is some variation; yet in certain larger skulls which are presumably of mongrel dogs, the more narrowed and deepened fossa is obvious.

Thorndike (1911), in an interesting article on the Indian sled-dogs of North America, doubts if pure-blooded Eskimo or "Husky" Dogs are today found in North America except possibly about the Coppermine River, Banks Land and Wollaston Land. "In general, the Eskimo Dog differs from the Indian variety in being more wolfish and in having less European strain. His tail is more bushy and he is cleaner-legged. His ears are more erect and pointed, while his body is larger in size"—this in comparison with the mongrel dogs of the northern forest Indians of the present day.

Origin.—From its evident similarity of appearance to the Siberian Sledge-Dog, it is generally accepted that the two are of similar origin. The Siberian Dog seems indeed to differ in little except possibly its slightly smaller size. Dogs of the same type are found across northern Asia into Lapland, whence certain authors have concluded that the Eskimo Dog was undoubtedly brought from the Old World by the Eskimo themselves, who must already have known how to use them in harness. This view seems on the whole very probable. The ultimate derivation of the Eskimo Dog and the so-called Spitz Dogs in general, is however, still obscure. Some form of Wolf is commonly looked to as the remote ancestor of the breed though direct proof is not available. Holland (1908, p. 232) has even gone so far as to suggest that certain well-preserved jaws discovered in a Pleistocene cave-deposit at Frankstown, Pennsylvania, may from their resemblance to those of an Eskimo Dog, have come from a wolf-like ancestor

of this breed. The associated fauna, however, is of a more southern character than would be expected as companions of this Arctic dog.

Of the larger dogs of the New World, the Eskimo Dog is the only one that habitually carries its tail curled forward over the hip. This character, striking as it is, does not seem to have been particularly studied from the standpoint of heritability, to see if it behaves as a Mendelian character when contrasted with a drooping tail. Yet it is a highly important trait, and is found not only among the dogs of similar appearance in the north of Asia and Europe, but in other varieties, possibly related, and of more southern habitat in those continents. The so-called Chow Dog of China, a medium-sized red, or sometimes black (Kreyenberg, 1910) dog, with erect ears and powerful shoulders has the same sort of tail. A similar, though slightly smaller dog standing 50 cm. high at the shoulder is found among the Battaks of Sumatra (Studer, 1901, p. 31). The same curled tail is found in the Pomeranian Dogs, that appear in the decoration of Greek vases (Keller, 1909) or as figurines of Mycenaean times. The fact that the curled tail carried over the hip is so widely characteristic of certain breeds of Old World dogs, where it seems to have been known from ancient times, implies that it originated there and strengthens the view that the Eskimo Dog came from Asia with the Eskimo. The contention that "the canine of the American aborigine, or Amerind, was simply a tame wolf, differing from its wild brother in the qualities that would naturally follow breeding in the semi-domestication of the savage" and that the dog "bred by the Indians in the forest regions, and the Eskimos, was always derived from the Gray wolf" (Thorndike, 1911), seems only remotely true. There is much evidence, though of a somewhat uncertain character, that wild male Wolves will breed with female Eskimo Dogs at proper seasons, and the northern Indians are said to encourage such occasional crosses. Thorndike states that tame wolves are sometimes seen in harness with the dogs in the North. Nevertheless, under usual circumstances, those who have lived in Arctic countries agree that wolves are highly unfriendly with the dogs, and a single wolf is more than a match for several dogs. There seems to be no evidence that Wolf cubs were habitually reared by either Eskimo or Indian, which one would expect to be the custom if the Eskimo Dog is merely a Wolf, tamed. Hearne (1796) mentions that some Indians, on finding a Wolf's den, fondled the little cubs, and painted their faces with vermilion, but returned them to the den and made no attempt to rear them. He adds (p. 362) that "all the wolves in Hudson's Bay are very shy of the human race, yet when sharp set,

they frequently follow the Indians for several days, but always keep at a distance. They are great enemies to the Indian dogs, and frequently kill and eat those that are heavily loaded, and cannot keep up with the main body."

A comparison of available skulls indicates that those of Eskimo Dogs from eastern Labrador and western Greenland are constantly smaller than those of eastern wolves, the teeth markedly smaller. European investigators (Studer, 1901; Anutschin, 1881; Woldrich, 1882) have described skulls and other bones of large dogs from deposits of the later Stone Age — Neolithic — one or two of which, the so-called *C. f. inostranzewi*, *C. f. ladogensis*, seem to be large animals much like Eskimo Dogs, and are considered as belonging to the same group.

Eiffe (1909) records a crossing of the Australian Dingo with an Eskimo Dog, in the Hamburg Zoölogical Gardens. The Dingo, a female, was an unusually pale reddish brown animal; the dog, a black East Siberian Sledge-Dog. The eight pups of this litter were more reddish in color than their mother, with slightly bushy tails, somewhat bowed upward. The old Dingo then paired with one of these reddish dogs, and produced eight young, five very pale like herself, three darker red. The ears of all the young were not at first erect, but became so in the course of five months.

Notes.—The accounts of the early voyagers leave no doubt that these large dogs were companions of the Greenlanders and American Eskimo before the coming of Europeans. Their use by the natives as sledge-animals makes them of prime importance in the Arctic conditions under which they live. Cranz and Egede, early Danish missionaries to Greenland, mention the dog-teams, and the latter author gives a crude figure. Scoresby in his *Greenland Journal*, (1823, p. 203) relates finding at Jameson's Land in eastern Greenland, the skull of a dog in a small grave, probably that of a child. The Eskimo of this part of Greenland must have had very little contact with Europeans up to that time. Cranz, in his *History of Greenland*, alludes to this custom of the natives, who believe that by laying the head of a dog beside the child's grave, the animal will show the ignorant babe the way to the Land of Souls, for a dog can find its way everywhere.

Among early accounts of the Eskimo Dogs, several of special interest are given in Hakluyt's *Voyages*. In The second voyage of Master Martin Frobisher, made to the West and Northwest regions, in the yeere 1577 (Hakluyt's' *Voyages*. Everyman's Library ed., 5, p. 137), it is related that a landing party at York Sound examined

the deserted tents of the Eskimos, "not taking any thing of theirs except one dogge." The possessions of these people are described, including "also dogges like unto wolues, but for the most part black, with other trifles, more to be wondred at for their strangenesse, then for any other commoditie needefull for our use." Again, "they frank or keepe certaine dogs not much unlike Wolves, which they yoke together, as we do oxen & horses, to a sled or traile: and so carry their necessities over the yce and snow from place to place: as the captive, whom we have, made perfect signes. And when those dogs are not apt for the same use: or when with hunger they are constrained for lacke of other victuals, they eate them: so that they are as needfull for them in respect of their bignes, as our oxen are for us." At Leicester's Island, in the present Frobisher Bay, a captive Eskimo caught one of the Englishmen's dogs and showed how the natives trained their animals. In the narrator's words, "Taking in his hand one of those countrey bridles, he caught one of our dogges and hampred him handsomely therein, as we doe our horses, and with a whip in his hand, he taught the dogge to drawe in a sled as we doe horses in a coach, setting himselfe thereupon like a guide: so that we might see they use dogges for that purpose that we do our horses. . . . They drawe with dogges in sleads upon the yce, and remoove their tents therewithall wherein they dwell in Sommer." This seems to be the earliest account of Eskimo Dogs in Arctic America by Englishmen. It is interesting to find that the explorers carried a dog with them from Europe, showing the possibility at an early date, of contamination of the breed with European dogs. John Davis, who sailed from England in June, 1585, "for the discoverie of the Northwest passage," met with Eskimo Dogs in August, in Cumberland Sound. His chronicler relates that here "we heard dogs houle on the shoare, which we thought had bene volves, and therefore went on shoare to kill them. When we came on land the dogges came presently to our boat very gently, yet we thought they came to pray upon us, and therefore we shot at them, and killed two: and about the necke of one of them we found a leatherne collar, whereupon we thought them to be tame dogs. There were twenty dogs like mastives with prickt eares and long bush tailes" (Hakluyt's Voyages, Everyman's Library ed., 5, p. 289).

At the present day, it is unusual to see typical Eskimo Dogs south of Hamilton Inlet on the Labrador east coast, though many mongrel individuals are found about the settlements between there and Newfoundland. Three centuries ago, however, the natives of the latter

island had dogs which from their apparent resemblance to wolves, may have been of the Eskimo breed. For Whitbourne, in his "Discourse and Discovery of Newfoundland" (London, 1622) writes that the natives of Newfoundland "are a people that will seeke to revenge any wrongs done unto them or their Woolves, as hath often appeared. For they mark their Woolves in the eares with several markes, as is used here in England on Sheepe and other beasts, which hath been likewise well approved. For the Woolves in these parts are not so violent and devouring as Woolves are in other Countries." The same writer speaks with astonishment of his own mastiff's familiarity with these tamed "Woolves" (Mercer, 1897), which it seems reasonable to conclude were really Eskimo Dogs.

Of the Eskimo Dog in Greenland, Brown (1868, 1875) considers the breed to be practically the same as that of Davis Straits and Kamtschatka. In western or Danish Greenland he found it more or less mixed with dogs of European descent and south of Holsteensborg not used by the Eskimo, as the sea is not sufficiently frozen over in winter for sledging. The same author adds that in 1861, Prof. Otto Torell brought several dogs from Greenland for the use of his expedition in Spitzbergen, where on account of the open water they were found useless and set free. Within a few years they were said to have increased in numbers.

PLAINS-INDIAN DOG.

Characters.—Size medium, slightly smaller than the Eskimo Dog; ears large, erect; tail drooping or slightly upcurved; coat rather rough, usually "ochreous tawny" or "whitish tawny," or sometimes black and gray, mixed with white.

Distribution.—Western North America from British Columbia south perhaps to the Mexican Boundary and eastward through the Great Plains Region.

Notes and Descriptions.—It is apparently to this dog that most of Lord's description (1866, 2, p. 222) applies in his Naturalist in Vancouver Island and British Columbia. So impressed was he by the general similarity of these dogs to coyotes, that he believed the one derived from the other, and makes one general description do for both, with the addition that in the dog the hair "becomes shorter, softer, and more uniform in coloration, although the tail retains its bushy appearance." The general color is an "ochreous grey," the hairs tipped with black, those of the neck tricolored, having their

"lower two-thirds reddish brown; then a ring of white, and a black tip." This pattern gives "a most curious speckled look" to the bristling neck of an enraged dog. Coues (1873) was equally impressed by the general resemblance of these dogs of the Plains Indians to coyotes and considered the two animals essentially the same in structural points, though he thought it "unnecessary to compare the skulls." Indeed, he accepted it as unquestionable that in every Indian community mongrel dogs are found, shading into coyotes in every degree. Such crosses he says, are obtained by picketing female dogs over night at proper times, thus allowing them to cross with coyotes. Morton (1851) quoting a letter from Dr. Cooper, Fort Duncan, Texas, speaks of every ranch having a dog resembling a coyote, "and a bitch to which no dog had had access, produced whelps, evidently a cross with the *Coyote*." Wortman, also (in Cope and Wortman, 1884, p. 8, footnote) after extended travel in the western United States corroborates Coues — but from hearsay evidence, however. He found among the Umatillas, Bannocks, Shoshones, Crows, Arrapahoes, and Sioux, mongrel dogs, "which to one familiar with the color, physiognomy and habits of the coyote, have every appearance of blood relationship," if they are not "in many cases, this animal itself in a state of semi-domestication." All such evidence, however, is unsatisfactory, and rests on general resemblances in form, color, and characteristics that may be common to both animals. A comparison of skulls and teeth would perhaps reveal more significant tokens of the true relationship, but hitherto nothing has been published as to the cranial characters of such animals. Yet, in his much-quoted paper on the origin of the American varieties of the dog, Packard (1885) appears to have been influenced by Coues's belief, and agrees with him in considering these dogs as merely tamed coyotes. In a journey through provincial Mexico he was struck by the general resemblance of the native dogs to these animals, and again, in 1877, on the upper Missouri took special note of the dogs of the Crow Indians, describing them as of wolf-like appearance, of the size and color of a coyote — a whitish tawny — but less hairy and with less bushy tails. Lord (1866, 2, p. 221) found a number of dogs with a little tribe of Indians at Sweltza, a small lake west of the Cascades, near which the boundary of British Columbia passes, "that were hardly in any degree altered from the cayote" in exterior appearance. He speaks of their burrowing deeply into the ground to bring forth their young, but this trait is found in dogs as well as in coyotes. From these accounts it is clear that the general appearance and coloration of this dog are strikingly

like those of one of the coyotes. Hamilton Smith (1840, p. 156) refers to the same dog as the "*Techichi* of Mexico, or the Carrier-dog of the Indians," and gives a figure (Pl. 4) of the only example he had seen, a tawny dog of normal proportions and with cropped ears. He confuses it however, with Richardson's "Carrier-Indian" or Short-legged Dog and further complicates his account by supposing it the same as the Mexican *Techichi*.

James Teit (1909) writing of the Thompson Indians of the upper Fraser River, British Columbia, also remarks on the general resemblance of their dogs to coyotes, but adds that through intercrossing with dogs imported by the whites, the breed has become totally extinct. They were good hunters, though poor watch-dogs, and the best ones for deer hunting were highly prized. Such dogs generally ran the deer to water, often bringing it to bay in some creek, and keeping it there till the Indian came up and dispatched it.

It is regrettable that more thorough comparison of the teeth of these dogs could not be made to test any supposed resemblance or relationship to coyotes. As Gidley (1913) has pointed out, the fourth lower premolar of the latter has normally *two* secondary cusps and a cingulum, that of the dog normally but *one* secondary cusp, a ready means of distinction in addition to other relative characters. It should be added that in numerous fragments I have examined from the southwest, there is no evidence of coyote influence.

Referable to this same breed are perhaps the *larger* dogs mentioned by Suckley (Suckley and Gibbs, 1860, p. 112) as kept by the Indians "about the Dalles of the Columbia," Oregon. These he describes as about the size of a foxhound, but much more slender, in color yellow or brindled.

A similar type of dog seems to have been kept by the Indians of California. At all events, a series of skulls from mounds on the southern coastal islands are hardly to be distinguished from New Mexican skulls. A skull found in association with that of an Indian, washed out after a freshet, from a bank at the junction of the Tuolumne and San Joaquin Rivers, California, is of the same medium-sized type, rather heavy of bone, slender of muzzle, and with feeble sagittal crest, mainly on the occiput.

Skeletal Measurements.—A cranium discovered in the course of excavations by Dr. A. V. Kidder at Pecos, New Mexico, may be attributed to this dog. It is nearly identical in size and proportions with several of the skulls from southern California from mounds on the island of San Nicolas, kindly loaned me by the Archaeological

Department of the University of California. These last are in an excellent state of preservation, of medium size, yet of massive bone, with roughened brain-case, and sagittal crest developed mainly on the interparietal region. The teeth are rather small, the first upper premolar lacking in some cases.

The following table gives the cranial measurements of several of these skulls. The first two, from Pecos, N. Mex., differ in that the one, a rostrum only, is considerably larger than the other, or any of the Californian skulls. Of the latter, there are several from mounds on San Nicolas Island, which represent a dog apparently identical with that of New Mexico. The last two columns give dimensions of two old dogs with much worn teeth; in the larger, indeed, the upper molars have been lost and their alveoli partially filled, while the remaining teeth are mere stumps. The smaller of these two skulls, while not very different in the measurements of the tooth-row, has a shorter, smaller cranium. It is very likely a mongrel between this larger dog and one of the short-nosed dogs ('*Pachycyon*'), a relationship further indicated by its slightly more upturned snout. It is further peculiar in lacking the first upper premolars on both sides, while in the lower jaw there are on both sides *four* molars, the second and third each with two roots and the fourth single-rooted like the usual third molar. Four molars in the lower jaw is not an unknown feature in the dog. Nehring (1882) found twenty dog skulls out of 650 in which there was an extra molar either in both upper or both lower tooth-rows, or in only one tooth-row.

Lucas (1897) has given a brief account of the cranium of a large dog, evidently domesticated, found in an ancient Pueblo Indian grave at Chaves Pass, Arizona, in 1896. Another of similar proportions was discovered at San Marcos, Texas, associated with flints, a human skeleton, and other bones. The former skull he regards as of a "broad-faced type," and describes it as "precisely similar in size and proportions to the cranium of an Eskimo dog from Cumberland Sound." He supposes these to be carrier-dogs, and recalls Clavigero's mention of them as "a quadruped of the country of Cibola [New Mexico], similar in form to a mastiff, which the Indians employ to carry burdens." I have not been able to examine these skulls, but they may be the same as the larger of the two New Mexico skulls here listed.

Measurements of the Skulls	N. Mex.: Pecos M. C. Z. 9,523	N. Mex.: Pecos M. C. Z. 9,522	Cal.: Stanislaus Co. U. C. 2,430	Cal.: S. Nicolas Id. U. C. 16,349	Cal.: S. Nicolas Id. U. C. 16,351	Cal.: S. Nicolas Id. U. C. 16,348	Cal.: S. Nicolas Id. U. C. 16,350
Occipitonasal length (excluding incisors)	—	173	170	164	172	178	159
Basal length	—	153	151	146	153	156	143
Palatal length	91	82	85	81	81	88	81
Median length of nasals	—	49	54	—	49	54	50
Alveolus of i^1 to anterior edge of orbit	82	74	73	67	72	72	68
Alveolus of i^1 to m^2	95	86.5	89	86	88	91.5	85
“ “ canine to m^2	77	71	74	69	72	75	70
“ “ p^1 to m^2	65	59.5	60	57	58	59	—
“ “ p^2 to m^2	57	53	56	50	52	55	51
“ “ p^3 to m^2	46	42	45	40	42	—	41
“ “ p^4 to m^2	34	33	34	30	32	32	31
Alveoli of m^1 and m^2	18	17	18	16.5	19	17	16.5
Length of carnassial (p^4)	19	18	20	19	17.5	—	17
Width of occipital condyles	—	33	34	31	33	36	33
“ “ palate at m^1	64	60	59	61	66	67	57
“ across supraorbital processes	—	47	43	55	53	54	46
Zygomatic width	—	—	97	106	112	111	97
Lower jaw, alveolus of i_1 to m_3	—	—	—	—	89	92	87
“ “ “ “ canine to m_3	—	—	—	—	80	85	79
Lower jaw, alveolus of p^1 to m_3	—	—	—	—	65	67	64
“ “ “ “ p_2 to m_3	—	—	—	—	62	63	61
“ “ “ “ p_3 to m_3	—	—	—	—	53	55	52
“ “ “ “ m_1 to m_3	—	—	—	—	34	34	33
Length of m_1 (carnassial)	—	—	—	—	21	20	21

Uses.— These dogs of medium size, were chiefly used by the Indians in transportation, secondarily in hunting. In the plains country from Saskatchewan to the Mexican Boundary, the *travois* was in general use. This consisted of two light poles, the smaller ends fastened together and resting on the dog's shoulders, the heavier ends

kept apart by a crosspiece and trailing behind. A leather collar served to keep this frame in place for dragging the goods piled upon it. In this way entire villages moved, the dogs dragging the household effects. The contrivance seems not to have been used west of the Rocky Mountains. Perhaps the earliest mention of the use of these dogs as pack-animals is found in Coronado's account of his journey in 1540 to 1542, from the City of Mexico to the Texas plains (see translation by Winship, G. P., 1904). When some ten days' march from the present Rio Pecos, Texas, Coronado and his followers came to Haxa, where the natives were found to have "packs of dogs." In moving camp, these Indians started off "with a lot of dogs which dragged their possessions." "They travel like the Arabs, with their tents and troops of dogs loaded with poles and having Moorish pack saddles with girths. When the load gets disarranged, the dogs howl, calling some one to fix them right." A letter from one of Coronado's men further describes the dogs. "These people," he writes, "have dogs like those in this country [Spain], except that they are somewhat larger, and they load these dogs like beasts of burden, and make saddles for them like our pack saddles, and they fasten them with their leather thongs, and these make their backs sore on the withers like pack animals. . . . When they move — for these Indians are not settled in one place, since they travel wherever the cows [*i. e.*, Bison] move, to support themselves, these dogs carry their houses, and they have the sticks of their houses dragging along tied on to the pack saddles, besides the load which they carry on top, and the load may be, according to the dog, from 35 to 50 pounds." Evidently these were the carrier-dogs of the Plains Indians, and the method of packing with the tent poles used as *travois* seems to be here first described.

As pack-animals, for moving camp in their pursuit of the Bison, these dogs were of great service to the Indians of the plains country, and every village was provided with troops of them.

As an article of food, the dog seems to have been somewhat analogous to the fatted calf. George Catlin (1841, 1, p. 14) writing of the Upper Missouri Indians, says: "We are invited by the savages to feasts of *dog's meat*, as the most honourable food that can be presented to a stranger."

SIOUX DOG.

Characters.— A large wolf-like dog, probably closely related to the Plains-Indian Dog but larger and gray rather than tawny in color.

Distribution.— Probably the north-central plains area, from the Missouri north perhaps to Saskatchewan.

Notes.— No doubt the carrier-dogs differed slightly among the various tribes of Plains Indians covering the wide stretch of country from Northern Mexico to Saskatchewan, so that local breeds of the general type could be distinguished did we have opportunity to compare them. Morton (1851), who tried to obtain information from frontier officers in the earlier half of the last century, quotes a letter from H. H. Sibley, a correspondent in Minnesota, who avers that "the Indian Dog differs much in size and appearance among different tribes" but that they all have small, sharp, erect ears. He particularly recalls that "among the Sioux, it is large and gray, resembling the Buffalo Wolf." Packard (1885) has mentioned "whitish tawny" Indian dogs seen in 1877, among the Crows of the upper Missouri. Lewis and Clark, on their famous journey, came upon a scaffold burial of an Indian squaw, near which lay two dog-sleds and the carcass of a *large* dead dog, between Mandan and the Yellowstone. These large gray dogs of the Sioux may have been a distinct breed from the tawny dog, of the size of a Coyote, and possibly the same as certain large dogs seen by Hind (1859) among the Crees of the Sand Hills. Sir John Franklin (in his *Journey to the shores of the Polar Sea*, 1829, 1, p. 176) briefly mentions the large dogs of the Crees in the Saskatchewan country. He adds that in the month of March, the female wolves "frequently entice the domestic dog from the forts, although at other seasons a strong antipathy seemed to subsist between them."

Hamilton Smith (1840) quotes an interesting letter from Prince Maximilian of Wied, likening the North American plains dog to a wolf, "excepting that the tail is more curved, and the color either "absolutely grey like wolves" or white, black, and black and white spotted. The latter coloring, however, may apply to some other breeds than that under consideration.

Figures probably representing this dog, are shown in some of the plates of Catlin's *Indians* (1841, colored edition, 2) small to be sure, but showing the gray coloring, large erect ears, and scimitar-shaped tail carried out behind. His Plate 103 in 2 is a spirited drawing illustrating a dog-fight in which all the dogs of the party, though burdened with their loads "*en travois*," are rushing to participate.

LONG-HAIRED PUEBLO DOG.

Characters.—A medium-sized dog of slender muzzle, erect ears, and normal bushy tail. Hair long and dense, pale yellowish, clouded with dark brown on ears and crown, whitish beneath on throat, belly, and feet. Feet well-haired. Probably this is to be looked upon as a local breed of the Plains-Indian Dog, from which it apparently differs only in its longer coat.

Distribution.—Known only from the Marsh Pass region of Arizona, but in former times probably common to the Pueblo tribes of Arizona and New Mexico.

General Account.—One of the remarkable discoveries of Messrs. Guernsey and Kidder, while exploring for the Peabody Museum, was an excellently preserved specimen of a medium-sized dog associated with a human burial. In the arid climate of Arizona, the dog had merely dried, so that the entire animal even to the thick hair was nearly intact. It is covered with a dense coat of long woolly hair, of a pale yellowish color, clouded on the back and head with brownish. On the sides of the body, the length of the hair is about 100 mm.; on the toes 30 mm. The culture period to which this specimen belongs, is believed by Mr. Guernsey to antedate that of the Cliff Dwellers, and hence must be at least several centuries old.

It seems probable that it was to this long-haired dog that Mendoza, a companion of Coronado, refers in a letter of 17 April, 1540, to the King of Spain, describing the pueblo of Cibola, then a famous Indian site, near the present town of Zuñi, New Mexico. This letter is translated by Winship (1904, p. 153) from the Spanish of Pacheco y Cardenas, (*Documentos de Indias*, 2, p. 356), and contains the following passage:—"In their houses they keep some hairy animals, like the large Spanish hounds, which they shear, and they make long colored wigs from the hair, like this one which I send to Your Lordship, which they wear, and they also put this same stuff into the cloth which they make." These "hairy animals, like the large Spanish hounds," seem probably, in the light of Mr. Guernsey's discovery, to have been the same as the dog found at Marsh Pass. It is recalled here that breeds of long-haired dogs were kept for shearing not only by the Indians of Puget Sound, but by the Chonos of the Taitao Archipelago, Chile, and their hair woven into blankets (see p. 475). There was formerly a breed of long-haired white or brown dogs among the aboriginal inhabitants of New Zealand, the product of which was similarly used (Colenso, 1878).

External Measurements.— It is not possible to remove the skull and limb-bones without injuring the mummy for exhibition purposes. A few dimensions, however, follow:—

Length from nose to root of tail, following backbone — about	700 mm.
Length of tail, (broken at tip) slightly over	200
Hind foot	141
Femur (approximately)	145
Tibia (approximately)	143
Upper jaw, front of canine to back of pm^4	55.5
Upper carnassial (pm^4)	18
Length of skull from occiput to tip of nose (approximately) . .	195
Width outside upper canines	31
“ “ carnassials	54
Zygomatic width — about	95
Lower jaw, front of canine to back of m_1	68.5
“ “ “ “ “ “ “ “ p_4	49
“ “ pm_1 to pm_4	35
Length of lower carnassial	21

LARGER OR COMMON INDIAN DOG.

Plates 7, 8.

1817. *Canis familiaris americanus canadensis* Walther, Hund, p. 43.
 1829. *Canis familiaris* var. *c. canadensis* Richardson, Fauna Boreali-Amer., **1**, p. 80 (not *Canis lupus canadensis* Blainville 1841, which is *Canis lycaon* Schreber).
 1834–6. *Canis canadensis* Reichenbach, Regn. anim., pt. 1, p. 46, fig. 564.
 — *Canis familiaris orthotus canadensis* Reichenbach, Naturg. raubth., p. 146, fig. 564.
 1867. *Canis domesticus borealis luparius* Fitzinger, Sitzb. K. akad. wiss. Wien, **56**, pt. 1, p. 409 (not *C. f. orthotus luparius* Reichenbach, Regne anim., pt. 1, p. 13, fig. 131; not *Canis domesticus luparius* Fitzinger, Sitzb. K. akad. wiss. Wien, 1866, **54**, pt. 1, p. 406; 1867, **56**, pt. 1, p. 396).
 1881. *Canis latrans domesticus* Langdon, Journ. Cine. soc. nat. hist., **3**, p. 299 (not *Canis familiaris domesticus* Linné, 1766).

Characters.— This was probably closely related to the Plains-Indian Dog, but seems to have been usually solid black or black and white in patches instead of resembling the Coyote in color. The skull has, when adult, a knife-like sagittal crest, a high forehead, and is rather slender. Limbs much longer than in the Short-legged Indian Dog

yet slightly inferior to those of a Greyhound. The first lower premolar was frequently wanting.

Distribution.—Dogs of this general type, agreeing fairly well in size and proportions were found among the forest Indians from Alaska southward to Florida and the Greater Antilles, and westward to the edge of the plains in the east central States. The more northern dogs seem to average a little larger than those from the south, but in the absence of more exact knowledge seem best referred to this type. No doubt in the far Northwest there was more or less mixture with the Eskimo Dog. Probably too, local strains of this general type of dog could be distinguished, did we know their external characteristics, but the skulls and teeth seem remarkably similar over a wide area.

Skeletal remains.—Cope (1893) was the first to describe the jaw of this dog from a specimen collected by Moore from a shell-mound on St. John's River, Florida. He was struck by the fact that the first lower premolar was missing and appeared not to have developed. The strong development of the entoconid of the carnassial, he also noticed. Moore, in the course of various explorations in Florida and Georgia discovered many remains of dogs, apparently of this type. In a large mound on Ossabaw Island, Georgia, he (1897) found several interments of human and dog-skeletons, the latter always buried separately and entire, showing that the dogs had not been used as food. Other dog-skeletons of a similar sort were found by Moore (1899) in aboriginal mounds on the South Carolina coast. Several of the skulls collected by him are in the Peabody Museum, where I have had the privilege of studying them. Putnam (1896) considered them the same as those of the larger Madisonville dogs. More recently the M. C. Z. has received from Prof. Carlos de la Torre, two fragmentary skulls of dogs associated with pre-Columbian burials in Cuba. These skulls seem to be essentially similar as far as can be judged. Miller (1916) has reported a lower jaw of a dog from an Indian site in Cuba.

Three crania in excellent condition, from the Madisonville, Ohio, site agree in their somewhat slender proportions, with narrow palate and rostrum. A strong but thin bony crest is developed along the midline of the brain-case, and there is a noticeable inflation of the region just back of the supraorbital processes. The first premolar is absent in both cranium and jaw of one specimen. Two crania from a shell-heap at La Moine, Maine, similarly lack the first premolar. One of these latter is a much larger skull than any of those from Madisonville, which may indicate some variation in the local breeds,

yet the general type seems to be the same. Hardly distinguishable from the Maine specimens in any way is a skull from Peel River, Yukon, (U. S. N. M. 6,219) collected about 1860 by Kennicott and representing probably the common Indian Dog of that region.

Cranial Measurements	Ohio: Madisonville P. M. 58,528	Ohio: Madisonville P. M. 71,801	Ohio: Madisonville P. M.	Yukon: Peel R. U. S. N. M. 6,219	Ala.: Montgomery P. M. 68,868	Ga.: Ossabaw Id. P. M. 52,362	Cuba M. C. Z. 10,064	Maine A. C. 53,902	Maine A. C.
Alveolus of i^1 to occipital condyle..	170	172	163	177	163	169	—	192±	168
Median length of nasals.....	56	62	57	—	57	57	—	—	—
Alveolus of i^1 to median edge of palate.....	85	90	87	88	86	90	—	93	—
Alveolus of i^1 to anterior edge of orbit.....	74	77.5	74	81	74	77	—	—	70±
Alveolus of i^1 to m^2	86	90	87	96	86	90	—	—	83
“ “ canine to m^2	72.5	75	72	79	71	74	74	86	70
“ “ p^1 to m^2	60	62.5	—	—	59	60	64	—	—
“ “ p^2 to m^2	52	56	55	62.5	52	52	55	—	56
Alveoli m^1 and m^2	18.2	—	20.8	19	17	17	16.3	—	19.8
Length of p^4	19	18	18.6	20.5	17.5	18.5	—	20.8	19.7
Width of occipital condyles.....	31	37.5	34	40	36	34	38	40	37
“ “ palate at m^1	59	57	61	66.5	54	60	62	68	55
“ across supraorbital processes.....	50	51	47	49	46	57	—	60	—
Zygomatic width.....	102	98	104	101	92	104	—	—	—

Of seven lower jaws from Maine shell-heaps, all but one lack the first premolar, and the same tooth is lacking in a ramus from Madisonville. It seems to be missing in the greater portion of lower jaws of this dog. The following measurements show the lengths of different parts of the tooth-row taken at the alveolar borders, because the teeth themselves are frequently lost.

Tooth-row Measurements	Maine: Sawyer's Id.	Maine: Sawyer's Id.	Maine: Sawyer's Id.	Maine: Calf Id.	Maine: Calf Id.	Yukon: Peel River	Ohio: Madisonville
Alveoli, i_1 to m_3	99	—	100	—	97	105	87
“ c to m_3	94	—	94	—	92	99	—
“ p_2 to m_3	72.5	74	74	75	71.5	77	65
“ p_3 to m_3	61	63	62	64	62	65	—
“ p_4 to m_3	49	49	50	49	50	50	—
“ m_1 to m_3	37	36	38	37	39	38	33.5
Length of tooth, m_1	22.5	22.3	23	21.5	24	23	21

Skeletal Measurements.— The first of the Calf Island jaws above, is accompanied by parts of the skeleton of the same animal. The limb-bones of this skeleton and those of several dogs from Madisonville, Ohio, measure:

	Maine: Calf Id.	Ohio: Madisonville	Ohio: Madisonville	Ohio	Ohio	Ohio	Ohio	Ohio	Ohio
Humerus	168	163	162	—	—	—	—	—	—
Radius	164	—	—	164	163	—	—	—	—
Femur	170±	—	—	—	—	173	—	—	—
Tibia	172	—	—	—	—	—	177	160	156

Notes and Descriptions.— On account of the finding of cranial fragments that appear to represent this animal, in aboriginal burials in Cuba, it is assumed that this is the dog mentioned by the first discoverers under Columbus. Oviedo (1535) writing of the aboriginal dogs in Haiti shortly after the discovery, declared that they were no longer to be found there in 1535, as all had been killed for food during a time of famine. These dogs he described as of all the colors found among the dogs of Spain, some uniformly colored, others marked with blackish and white, or reddish brown. The coat of some was woolly, of others silky or satiny, but most of those in Haiti were between silky and satiny, yet rougher than the Spanish dogs; with ears pointed and

erect like those of wolves. None of these dogs barked. Oviedo adds that similar dogs were plentiful in many parts of the continent, as in Mexico, Santa Marta, and Nicaragua. He had eaten their flesh and considered it excellent, resembling lamb. In Nicaragua and Mexico the Indians bred numbers of them and at their great festivals dog-meat was considered the best dish of all. The natives of Haiti hunted some species of *Hutia* with these dogs.

Very little seems to have been written descriptive of this breed. In his essay on the origin of dogs, Hunter (1787) mentions that a Mr. Cameron, who had lived among the Cherokee Indians, informed him that the dog found in their country was "very similar to the wolf." Cameron thought it remarkable there were not sundry breeds of dogs among these Indians, as in Europe. William Bartram (1792, p. 220), during his travels in Florida, made special note of a "single black dog, which seemed to differ in no respect from the wolf of Florida, except his being able to bark as the common dog." It belonged to an Indian, who had trained it to tend a troop of semiwild horses, "keeping them in a separate company where they range; and when he is hungry or wants to see his master, in the evening he returns to town, but never stays at home at night." Barton (1805) appears to have made more particular inquiry of Bartram concerning these Indian Dogs of Florida, and describes them as "very similar to the *Canis Lycaon*, or black wolf," yet they are not always black "but of different colours, commonly of a bay colour, and about one third less than the wild black wolf. It carries its ears almost erect, and has the same wild and sly look that the wolf has." Barton adds that the dogs of the Cherokees were already (1805) much intermixed with the European dogs.

Péter Kalm informed John Bartram that the dogs of the Canadian Indians (?Montreal) were like those in Sweden with erect ears, and Bartram himself (in a letter to George Edwards, 1757) recalled as a boy seeing the Indian Dogs, with erect ears, accompanying their masters on occasional visits to his father's house in Pennsylvania. Barton (1805), who seems to have made diligent inquiry about these dogs, further describes their aspect as "much more that of the wolf than of the common domesticated dogs. His body, in general, is more slender than that of our dogs. He is remarkably small behind. His ears do not hang like those of our dogs, but stand erect, and are large and sharp-pointed. He has a long, small snout, and very sharp nose." This breed, he says, was still preserved in the greatest purity among the Six Nations, from whom the Delawares acknowledge that they received it.

Judging from the numerous shell-heap remains of what seems to be this same dog, it was formerly common among the New England Indians. In Hakluyt's *Voyages* (Everyman's Library ed., 6, p. 95) is an account of The voyage of the ship called the *Marigold* of Mr. Hill of Redrife unto Cape Briton and beyond to the latitude of 44 degrees and an half, 1593. The narrator tells of meeting with a party of "Savages" at Cape Breton in July, who upon the accidental discharge of a musket, came "running right up over the bushes with great agilitie and swiftnesse...with white staves in their handes like halfe pikes, and their dogges of colour blacke not so bigge as a greyhounde followed them at their heeles; but wee retired unto our boate."

It is probably to this breed of dog that Charlevoix refers in his *Journal of a voyage to North America* (London, 2 vols, 1761, transl.). "The Indians," he writes, "always carry a great number of dogs with them in their huntings; these are the only domestick animals they breed, and that too only for hunting; they appear to be all of one species, with upright ears, and a long snout like that of a wolf" (1, p. 187).

This is the "major" type of Indian dog reported by Loomis and Young (1912) from Maine shell-heaps, where rather large-sized specimens have been discovered. Dog-remains have been found also in Connecticut (MacCurdy, 1914) and Block Island, R. I. (Eaton, 1898).

An Indian Dog-skull (Plate 7) collected by Kennicott on the Peel River, about 1860 (U. S. N. M. 6,219) is hardly different, except for its very slightly greater size, and seems best referred to the same sort of dog, though possibly a distinguishable breed. Richardson (1829) named this dog *Canis familiaris* var. *canadensis*, and says it is the kind "most generally cultivated by the native tribes of Canada and the Fur countries." He describes it as intermediate in size and form between the Eskimo and the Hare-Indian Dog. Its fur is black and gray, mixed with white; some are all black. Apparently identical with the skull from Peel River is another collected by Dr. W. H. Dall, from a prehistoric Aleut village site in Unalaska. Dr. Dall notes that this is the only dog-skull which had been found in the undeniably prehistoric kitchen-middens of the Aleutian Islands. It still retains the upper carnassial, which measures 20.5 mm. in length. The occipital condyles are 38 mm. across. The first upper premolar was apparently lacking.

Probably it was a dog of this breed that Audubon figured as the Hare-Indian Dog, from a living one in the gardens of the Zoölogical

Society of London. Bernard R. Ross (1861) seems to have confused the two as well; for a skull collected by him at Fort Simpson and sent to the U. S. N. M. as "*Canis lagopus*" is even larger than the one from Peel River and almost undoubtedly a cross with an Eskimo Dog. Both skulls lack the first lower premolar.

In the North the Common Indian Dog is largely used among the forest Indians as a beast of burden.

Samuel Hearne, on his famous journey to Peel River, 1769-72, observed that the Indians' "kettles, and some other lumber, are always carried by dogs, which are trained to that service, and are very docile and tractable. * * * These dogs are equally willing to haul in a sledge, but as few of the men will be at the trouble of making sledges for them, the poor women are obliged to content themselves with lessening the bulk of their load, more than the weight, by making the dogs carry these articles only, which are always lashed on their backs, much after the same manner as packs are, or used formerly to be, on pack-horses."

KLAMATH-INDIAN DOG.

Characters.— A medium-sized dog, with a short, bushy tail.

Distribution.— So far as known, this peculiar breed was found only among the Indians in the Klamath River region of Oregon.

Remarks.— The only mention of this dog that I have found is the following by Gibbs (Suckley and Gibbs, 1860, p. 112):

"On the Klamath is a dog of good size, with a *short tail*. This is not more than six or seven inches long, and is bushy, or rather *broad*, it being as wide as a man's hand. I was assured they were not cut, and I never noticed longer tails on the pups. They have the usual erect ears and sharp muzzle of Indian dogs, but are (what is unusual with Indian dogs) often *brindled gray*."

Presumably the shortened tail arose as an independent variation among dogs of the Plains-Indian Dog type and was preserved among these dogs through selective breeding. Similar short-tailed breeds are well known among European dogs, as in the English Sheep-dog, and certain varieties of Bull-terriers. MacFarlane (1905, p. 696) gives an account of a very much prized Eskimo Dog he owned in the Mackenzie District, that was born tailless and undersized, but proved an excellent sled-dog.

SHORT-LEGGED INDIAN DOG.

Plate 5, fig. 1.

1829. *Canis familiaris* var. d. *novae caledoniae* Richardson, Fauna Boreali-Amer., 1, p. 82.
(?) 1912. *Canis familiaris, minor* Indian dog, Loomis and Young, Amer. journ. sci., ser. 4, 34, p. 26, fig. 4, D.

Characters.—Ears erect, head large in proportion, and body long; the legs relatively short but not distorted as in our Turnspits. Fur of the body short and sleek, that of the tail longer. This is possibly a derivative of the Common or Larger Indian Dog.

Distribution.—It is hardly possible to trace the former distribution of this type of dog. It was found by Richardson in southern British Columbia, and a dog apparently similar is known from Quebec, and perhaps formerly in New England and New York. Probably it was found among canoe-using or forest-living tribes in the North, hence was infrequent or absent in plains country.

Notes and Descriptions.—Apparently Richardson (1829) was the first to take special note of this breed. He found it among the Attnah or Carrier Indians of "New Caledonia," (now British Columbia) and it seems to have been bred as well by neighboring tribes as far south at least as northern California. For Gibbs (Suckley and Gibbs, 1860, p. 112) makes particular mention of seeing "one peculiar looking dog on Eel River, in the interior of northern California, among very wild Indians. It had *short* legs and long body, *like a turnspit*." Suckley in the same work, briefly says that "the Indian dogs about the Dalles of the Columbia [Oregon] are so varied in appearance that no *special* description can be given. We might, however, make two types. The *large* * * * and the *small*, resembling the '*turnspit kind*' of which Mr. Gibbs speaks. The latter are generally white, or spotted liver and white, or black and white. This kind is kept more as a playmate for the children and a pet for the women."

It is significant that Suckley mentions the "varied" appearance of the Oregon dogs, so that it was possible to refer them in general to but two types. This may have been a result in part of the interbreeding of the larger and the smaller types, and in part perhaps of a mixture as Suckley suggests with European breeds already introduced.

Although generally associated with the Indians of British Columbia and neighboring parts of the northwestern United States, it seems likely that this or a similar breed may have been much more widely distributed over northern North America, as far east and south as Quebec, New England, and New York, if not farther. An excellent photograph given me by Mr. W. B. Cabot (Plate 5, fig. 1) was obtained a few years since among the Bersimis Indians, Quebec, and seems to represent a dog of the same general type. The large head, erect ears (somewhat laid back in the photograph), long, heavy body, short, straight legs, up-turned tail, agree well with other descriptions. This particular individual has the spiritless air of an old dog.

That this breed of dog was found at least as far south as the southern coast of New England, may possibly be inferred from the account by Livermore (1877, p. 58) of the dogs of the Block Island Indians, of Rhode Island. This isolated colony of Indians numbered some 300 individuals up to the year 1700, but by 1774 was reduced to only 51. In 1876, there was known to be but a single one living on the island. According to the author just mentioned, "the 'dogs' of Block Island belonging to the Manisseans before the English came have their descendants here still, it is believed. They are not numerous, but peculiar, differing materially from all the species which we have noticed on the mainland, both in figure and disposition. They are below a medium-size, with short legs but powerful, broad breasts, heavy quarters, massive head unlike the bulldog, the terrier, the hound, the mastiff, but resembling mostly the last; with a fierce disposition that in some makes but little distinction between friend and foe." The description here given, unsatisfactory though it be, implies a dog much like that shown in fig. 1, Plate 5.

Skeletal Remains.—I am unaware of the existence in any museum, of bones that may be definitely associated with the Short-legged Indian Dog. But, as pointed out by Loomis and Young (1912), there are in the prehistoric shell-heaps of the New England coast remains of a larger and a smaller Indian Dog, the latter of which on the strength of the evidence just given as to the former presence of the short-legged breed in eastern Canada and New England, may tentatively be referred to this animal. The authors mentioned have characterized the lower teeth of this smaller dog on the basis of jaws from the Maine shell-heaps and through the kindness of Professor Loomis I have had opportunity to study the specimens.

The mandibles are all more or less broken, but include several in fairly good condition. They differ from those of the Larger or Com-

mon Indian Dog in the smaller size of the individual teeth as well as in the shorter tooth-row. Yet the contrast is not always very striking and no doubt there was more or less intercrossing of the two types. The teeth of the smaller dog are usually more close-set than those of the larger, and on comparison, the carnassial tooth is seen to be decidedly smaller, its metaconid sometimes quite obsolete, and with a distinct tendency for the outer of the two cusps of the heel (hypoconid) to become enlarged and trenchant. As in the Common Indian Dog, and in American aboriginal dogs generally, it is common if not usual, for the first lower premolar to be lacking, and the same is frequently true of the first upper premolar. Such an anomaly is occasional in all domestic dogs. Indeed, Bourguignat (1875) founded his genus *Lycorus* on such a fossil canid jaw — probably of a wolf — from a cavern-deposit in France. In his specimen the first premolar was lacking in each ramus.

Measurements of the lower jaws and fragments of upper maxillae	Me. Flaggts.	S 1	985	1209	C 1	C 2	183
Greatest length of lower carnassial	—	19.8	20.3	21	20	20.6	21.3
Number of lower premolars	—	3	3	3	3	3	4
Alveolar length p_2 to m_2	—	65.5	—	68 ‡	65	64	66
“ “ p_2 to p_4	—	33	31.5	34	32.5	32	33
Alveoli, upper p^3-m^2	39.5	—	—	—	—	—	—
“ “ p^4-m^2	29	—	—	—	—	—	—
“ “ m^{1-2}	16	—	—	—	—	—	—
Greatest length of p^4 (tooth)	17.3	—	—	—	—	—	—

Loomis and Young (1912) mention similar small jaws from Indian sites in Arkansas.

Of limb-bones referable to the Short-legged Dog it is particularly desirable to obtain specimens for comparison with the other breeds. Among limb-bones in the Amherst collection from Maine are several longer and shorter. The latter in the lack of evidence to the contrary, may be regarded as having come from the present type. Of two humeri, one is nearly perfect and appears to be that of an adult animal, with its epiphyses thoroughly fused to the shaft. Its ole-

cranial perforation is large and oval, somewhat less than half the breadth of the shaft at the same point. The deltoid ridge is typically prominent. The bone itself is slender and not in any way thickened or distorted. It measures:—greatest length, 130 mm.; antero-posterior diameter of head, 31; transverse diameter of head, 25; transverse diameter of distal end, 25.5; width of distal articular surface, 17. It is thus about three quarters the length of the humerus in the Larger or Common Indian Dog, proportionally slender, yet considerably longer than that of the Techichi. What is undoubtedly the radius of the same dog, measures 129 mm. in greatest length; 14.5 in diameter at the proximal and 19 at the distal end. A femur, possibly of the same specimen measures:—greatest length, 136 mm.; greatest transverse width of distal end, 25. It is thus slightly longer than the humerus, in the normal proportion. The limb-bones indicate a dog about the stature of a terrier or a basset-hound.

Among many isolated lower jaws from Maine shell-heaps are some in which the carnassial tooth is noticeably narrow and intermediate in size between that of the typical Short-legged Dog and the Larger or Common Indian Dog. These probably represent cross-bred animals as Loomis and Young have suggested.

Uses.—These smaller dogs were apparently the familiar household pets or hunting companions of the Indians of forested country or of the canoe-using tribes. They were too small to be of service as pack-animals with *travois* or *pannier*, and hence seem not to have been much in favor with the Plains Indians, whose main subsistence was the Bison for the hunting of which, dogs were unnecessary. Suckley (1860) particularly mentions that they were kept more as a “play-mate for the children and a pet for the women” among the tribes of the Columbia River. Moreover, a small dog is a better companion in a canoe than a larger clumsy animal.

Richardson says of the Short-legged Dog, that it was used in the chase, was very active and agile at jumping. It was perhaps a dog of this type that was used in hunting the beaver. George Bird Grinnell (Forest and stream, 1897, 49, p. 382) writes that the Cheyenne Indians, before their intercourse with whites, hunted the Beaver with dogs, by breaking the dam and thus exposing the beaver houses and their underwater entrance. “The dogs which were small enough to enter this hole, and yet were pretty good sized animals, went into the hole” and worried the beaver till it followed the dog out, when an Indian waiting outside, clubbed the beaver to death. Le Jeune, in his *Relation de ce qui c’est passé en la Nouvelle France* [Quebec]

en l'année 1633 (Jesuit relations, 1897, 5, p. 165) mentions this use of dogs in Beaver hunting; "sometimes when the dogs encounter the Beaver outside its house, they pursue and take it easily; I have never seen this chase, but have been told of it; and the savages highly value a dog which scents and runs down this animal." Le Jeune speaks of the familiarity of the Indian dogs, that in winter they are unable to sleep outside and come into the cabins, lying and walking over the inmates. Elsewhere he speaks of giving food to a 'petit chien,' but adds that "the savages do not throw to the dogs the bones of female Beavers and Porcupines,—at least certain specified bones....yet they make a thousand exceptions to this rule, for it does not matter if the vertebrae or rump of these animals be given to the dogs, but the rest must be thrown into the fire."

Testimony of early travellers is somewhat conflicting as to the eating of their dogs by the Indians. Le Jeune states that "in the famine which we endured, our savages would not eat their dogs, because they said that, if the dog was killed to be eaten, a man would be killed by blows from an axe." On other occasions, however, such scruples were not observed. Thus Father Rasles, in a letter written to his brother in 1716, from Narantsook, forty miles up the Kennebec River, Maine, says that at the news of the French and English War, the Indian young men were ordered by the older Indians to kill dogs for the purpose of making the war-feast (Jesuit relations, 1897, 67, p. 203) — possibly here with a view to sending their dogs on before, should death overtake their masters. Feasts of dog-flesh seem to have been commoner among the Indians of the West and South, and Fremont in his narrative of his explorations (1845, p. 42) recounts being invited, as a mark of honor, to a dog-feast. "The dog was in a large pot over the fire, in the middle of the lodge, and immediately on our arrival was dished up in large wooden bowls, one of which was handed to each. The flesh appeared very glutinous, with something of the flavor and appearance of mutton. Feeling something move behind me, I looked round, and found that I had taken my seat among a litter of fat young puppies."

Harmon, writing in 1820, after nineteen years spent in travel through the Northwest from Montreal to the Pacific, speaks of the smaller dog used in hunting, and a larger dog as well. The latter is rank and not good eating like the former, of whose flesh the Indians and French Canadian *voyageurs* were very fond.

In the New England shell-heaps, the dog-remains occur either as burials — the entire skeleton undisturbed — or as scattered portions,

as if the bones had been thrown out after the flesh was eaten. There seems, however, to be little or no evidence that the bones were cracked for marrow.

The Jesuit father Biard in 1616, mentions dogs, kettles, and axes as among the presents given by a young Indian to the father of his intended bride in payment for her. Among other customs of the Indians of Arcadia, he recounts that at a funeral, dogs are presented the dying man, as well as skins, arrows, and so forth. The dogs are then killed in order to send them on before him to the other world, and their flesh is later eaten by the people (Jesuit relations, 1896, 3, p. 101).

CLALLAM-INDIAN DOG.

Plate 4, fig. 1.

1840. *Canis laniger* Hamilton Smith, Jardine's Nat. library. Mammalia, 10, p. 134.

1867. *Canis domesticus, camtschatkensis longipilis* Fitzinger, Sitzb. K. akad. wiss. Wien, 56, pt. 1, p. 406.

Characters.—A medium-sized dog, with erect ears, and bushy tail. Hair rather thick and woolly; white, or perhaps brown and black.

Distribution.—Formerly found among the coast Indians of the Puget Sound region and Vancouver Island. Lord (1866, 2, chap. 11) asserts that these dogs seem to have first been kept by the Chinook Indians, once very numerous near the mouth of the Columbia River, and were thence carried to Puget Sound and Nainimo. The source of this information is not given, but it is worth remarking that Lewis and Clark make no mention of the breed on the Columbia. Vancouver found them near the then Port Orchard, and apparently at least as far up the Sound as Admiralty Inlet. Hamilton Smith implies that they were to be found at Nootka Sound on the west coast of Vancouver Island.

Descriptions.—The earliest account of this dog is that by the navigator, Vancouver (1798, 1, p. 266). In May, 1792, while at Port Orchard, Puget Sound, he writes:—

“The dogs belonging to this tribe of Indians [at Port Orchard] were numerous, and much resembled those of Pomerania, though in general somewhat larger. They were all shorn as close to the skin as sheep are in England; and so compact were their fleeces, that large portions

could be lifted up by a corner without causing any separation. They were composed of a mixture of a coarse kind of wool, with very fine long hair, capable of being spun into yarn. This gave me reason to believe, that their woollen clothing might in part be composed of this material mixed with a finer kind of wool from some other animal, as their garments were all too fine to be manufactured from the coarse coating of the dog alone. The abundance of these garments amongst the few people we met with, indicates the animal from whence the raw material is procured, to be very common in this neighborhood; but as they have no one domesticated excepting the dog, their supply of wool for their clothing can only be obtained by hunting the wild creature that produces it; of which we could not obtain the least information." Elsewhere he mentions a deer "they had killed on the island, and from the number of persons that came from thence, the major part of the remaining inhabitants of the village, with a great number of their dogs, seemed to have been engaged in the chase," this near Admiralty Inlet. Farther up Puget Island, $48^{\circ} 21'N$, $237^{\circ} 57\frac{1}{2}'W$, at a large village "they were met by upwards of two hundred [Indians], some in their canoes with their families, and others walking along the shore, attended by about forty dogs in a drove, shorn close to the skin like sheep [this in June]" (*Ibid.*, p. 284).

Hamilton Smith (1840) who, in addition to Vancouver's account, had information from an Indian who had resided two years at Nootka, speaks of it as a large dog, "with pointed upright ears, docile, but chiefly valuable on account of the immense load of fur it bears on the back, of white, and brown, and black colours, but having the woolly proportion so great and fine, that it may well be called a fleece."

Notwithstanding Smith's assertion as to the "brown and black colours" of this dog, it is not at all certain that this was the usual case. Suckley (1860, p. 112) says positively that "all the Clallam dogs that I saw were *pure white*; but they have the sharp nose, pointed ear, and hang-dog, thievish appearance of other Indian dogs." Gibbs also (*Ibid.*) mentions their whiteness only, and adds that the very soft hair is sheared like the wool of sheep, and made into blankets, though at that time, 1860, it was "generally intermixed with the ravellings of old English blankets to facilitate twisting with [?into] yarn."

Lord (1866) further remarks that this white, long-haired dog was kept by only a few coast tribes near Vancouver. The dogs were confined "on islands to prevent their extending or escaping," and it differed "in every specific detail from all the other breeds of dogs

belonging to either coast or inland Indians." He supposes it to be of Japanese origin, recalling the long-haired Japanese Lap-dog, which however, seems remote enough in other characters. Lord adds that in the manufacture of rugs from the hair of this dog, the Indians often added the wool of the Mountain Goat, or duck feathers, or wild hemp. They dyed the hair as well. He obtained several of these blankets along the coast for the British Museum. Newcombe (1909, p. 50) gives a further account of the method of making yarn from the hair, which he says, was removed from the dried skin of the dog with knives or pulled out after moistening the hide and "sweating" the hair to loosen the roots. The wool was then made into loose threads by rolling. With the introduction of Hudson's Bay Company blankets this industry has ceased and the dog was practically extinct at the time of his writing.

As to the origin or affinities of this breed, little can be said. Some writers have classed it with the Siberian and Eskimo dogs, but it is likely that it was a breed of the larger type of Indian dog. The disinclination to take to water, made use of by the Indians to confine the animals to islands, is a trait shared by the Eskimo Dog. The precaution was possibly taken in order to prevent crossing with other breeds of Indian Dogs.

Windle and Humphreys (1890) in their table of cranial proportions of Eskimo Dogs, include those of a Nootka Dog in the British Museum. It is not clear, however, if it was from a dog of the breed under consideration, and as no actual dimensions are given, the figures are not comparable with other direct measurements.

I am indebted to Mr. C. T. Currelly, Curator of the Royal Ontario Museum of Archaeology at Toronto, for a photograph (Plate 4, fig. 1) of the unique painting made at Victoria, B. C., in 1846, by Paul Kane and now at that Museum. In the foreground is one of the white woolly dogs in question, its apparently erect ears nearly hidden in the long hair of the head. Nearby an Indian woman is weaving a blanket, no doubt from yarn made of dogs' hair, a ball of which another woman in the background is spinning. The use of dogs' hair in making blankets is not confined to the Clallams. The ancient Zuñis appear to have made similar use of it; and Bannister (1869) mentions an Indian blanket from Mackenzie River, woven of dogs' hair. The natives of New Zealand regularly employed dogs' hair for braiding and ornament.

INCA DOG.

Plate 9.

1844. *Canis ingae* Tschudi, Unters. über die fauna Peruana. Therologie, p. 13, 249.
1885. *Canis ingae pecuarius* Nehring, Sitzb. Gesellsch. naturf. freunde Berlin, p. 5-13.

Characters.— This is the larger dog of the ancient Peruvians. It was about the size of a small Collie, but more heavily proportioned. Tschudi describes it as having the head small, snout rather sharply pointed, upper lip not cleft; ears erect, triangular, small; body short and strong, squarely built ("untersetzt"), legs rather short; tail about two thirds the length of body, fully haired and curled forward. Pelage rough, long, and thick; color dark ochre-yellow with dark wavy shadings; belly and inner side of limbs somewhat brighter than the ground color of the back. No light spots above the eyes.

The skull is heavy in proportion to its size, with a narrow rostrum. The brain-case is rugose for the attachment of muscles, yet the temporal muscles, even in old dogs seem to little more than meet medially, so that at most only a low sagittal crest is formed in old animals except at the extreme occiput, where it is contrastingly marked, forming a high knife-edge on the median line of the interparietal. The palate shows a strong thickening at its posterior end, forming two low ridges one on each side between the last molar and the posterior narial opening.

Distribution.— The former distribution of this breed has not been definitely traced. Mummified remains are known from Ancon, Peru, and from various sites that have been excavated in that country. In Tschudi's time it appeared to be confined to the upland tribes of Indians. Of this type were all the mummies and skulls of dogs found by him in the ancient graves among the Sierras. It probably was kept by the Indians of northwestern Argentina as well.

Nomenclature.— Tschudi in 1844, was apparently the first to name this as a distinct breed of dog, *Canis ingae*. Forty years later Nehring in writing of the dog-mummies from the ancient necropolis of Ancon, referred it to a collie-like type with the combination, *Canis ingae pecuarius*. It is, however, very different cranially and otherwise from the Collie.

Measurements.— The largest Inca Dog among those from Ancon

studied by Nehring (1884a) was smaller than a Sheep-dog, with a skull about 172 mm. long, humerus 147, ulna 172, radius 140. A smaller one had a skull length of 165, head and body 660, tail including hair 240, humerus 130. In the lower jaws the first premolar was frequently missing.

The following table gives measurements of the six largest skulls among a series of nine belonging to the U. S. N. M.

Measurements of the Skulls	172,888	172,859	176,310	172,858	176,386	176,309
Length, (occiput to anterior base of incisors)	155	164	160	163	172	178
Basal length	139	145	146	144	151	159
Palatal length	78	81	81	79	84	86
Orbit to tip of premaxillary	63	69	66	68	72	75
Upper tooth-row	83	—	84	—	—	93
“ “ (alveoli)	80	84	82	82	85	89
Front of canine to back of molar ² (crowns)	65	—	69	—	—	76
Front of canine to back of molar ² (alveoli)	64	68	67	67	69	74
Length of premolar ⁴ (crown)	16.5	18	17	17.5	17.5	19
“ “ “ (alveolus)	16	17	16	16.5	17	17
“ “ molars ¹⁻² (crowns)	17	—	17	—	18	19
“ “ “ (alveoli)	15.5	17	15	16	16.5	17
Zygomatic width	92	99	98	96	108	107
Breadth of occipital condyles	32	34	33	32	34	35
Median length of nasals	48.5	—	51	52	55	56

Remarks.— Writing about 1844, Tschudi describes the chief characteristics of this dog as treachery and mischievousness. Every Indian hut and shepherd of the Sierra and puna had several. They seemed to show a special antipathy toward white people. A European traveller approaching an Indian hut on horseback would be beset by these dogs springing up against his horse to bite his legs. They are courageous, and fight an enemy with determination, dragging themselves to the attack even when mortally wounded. The Indians train them to track and capture tinamous.

In their great work on the Necropolis of Ancon, Reiss and Stübel include a brief chapter by Nehring (1884b) on the mummified remains of dogs discovered there. Some of these are figured and show a pale

yellowish coloring with darker areas. In a more extensive article Nehring (1884a) gives a particular account of the dogs of Ancon. He first transcribes passages from Garcilasso de la Vega to show that the Incas had dogs previous to the Spanish conquest, and that the dog entered into certain religious rites of the Incas. A mummified dog is described as having thick hair, shorter, however, on head and feet, thickest on neck and breast forming a kind of mane. The color was yellow, clear or soiled in places, with irregular brown-shaded areas. The tail was thick and bushy, wolf-like, also yellow. The ears of most of the specimens seemed to have been clipped. He suggests the North American Wolf or Coyote as the original source of the Inca dogs, but there seems no ground for the selection of either as an immediate ancestor.

More recently, Eaton (1916, p. 25) has recorded the discovery of dog-mummies with pre-Columbian burials at Machu Picchu, Peru. He adds that "dogs of this general type, though usually a little smaller than those figured in Reiss and Stübel's Necropolis of Ancon, were frequently seen in the parts of the Cordillera that I visited, and these animals may be largely derived from the ancient stock.... The modern Indian dogs of this ancient type are very wolf-like and manifest a most inconvenient fear of the camera." He suggests the obvious possibility of present-day mixture with breeds imported from Europe, and gives a reproduction (p. 50, fig. 47) of a photograph showing dimly an Indian with his dog.

The fine series of Peruvian dog-skulls in the U. S. N. M. contains nine that show complete gradation in size between the smallest (which I have considered more or less typical of the Techichi) and the largest which represents the Inca Dog. Since these skulls are more or less comparable as to age, it seems likely that the gradation in size is due to free interbreeding of the two sorts of dogs. The largest skull of the series (U. S. N. M. 176,309, of which the measurements have been given) is almost precisely matched by the skull of a Common Indian Dog from Peel River, Arctic America, collected by Robert Kennicott about 1860 (U. S. N. M. 6,219). The only obvious differences are that the palate of the Inca Dog shows the peculiar thickened ridges at the posterior end and is much narrower across the occipital condyles. The latter characteristic is shared by the other dog-skulls from Peru in contrast with the northern dogs, and is no doubt among the latter a result of their use as sledge-dogs, for the greater development of the neck and chest muscles in hauling might well enough demand a broader support from the skull. This general similarity

of skull and skeletal proportions probably indicates a closer relationship with the larger Indian dogs of northern North America, than with the Wolf or Coyote as Nehring has suggested.

What may be feral dogs of this breed are said to be found in the Island of Juan Fernandez, off Peru. According to Ermel (1889, p. 53) they are the native Araucarian dogs, shaggy-coated, of medium size, and very powerful. Semitamed ones are sometimes used there in hunting the feral goats.

Ihering (1913) has recorded the discovery of an entire skeleton of a dog at Hualfin, Salta Province, in northwestern Argentina. Its skull measurements, as recorded by this author, correspond well with the larger of those above given, and his identification of the specimen as an Inca Dog is probably correct.

LONG-HAIRED INCA DOG.

Characters.— Apparently similar to the Inca Dog, but with longer coat.

Distribution.— Peru and probably coastwise to parts of Chile.

Notes.— In his Bibliography of the tribes of Tierra del Fuego and adjacent territories, Cooper (1917, p. 44) mentions "a breed of long-haired shaggy dogs" which was formerly raised among some of the Chonos Indians north of the Taitao Peninsula, Chile, about Lat. 45° South. Nothing is known about these dogs except the statements of Goicueta and Del Techo, based perhaps on independent testimony. It is assumed that this breed was of native origin since at that early date (about 1553) it is rather unlikely that such dogs would have been obtained from Europeans. Possibly they were derived from the larger collie-like type of Inca dog anciently found among the Peruvians (Eaton, 1916, p. 49). From the hair of these dogs, the Chonos made short mantles that covered the shoulders and upper part of the trunk. According to Cooper, the information of Goicueta is based on the relation of Cortés Hojea's expedition of 1553-54, when he commanded one of the vessels under Ulloa, and possibly also furnished one of the sources for Del Techo's account. The latter was a Jesuit missionary who wrote in 1673 concerning the labors of his brethren among the Chonos of the Guaitecas Islands.

Referable to this breed is probably the long-haired dog described by Nehring (1887a) from a well-preserved mummy found in the course of excavations at Ancon, Peru. It was found wrapped in cloth of

tree-wool, its head and feet tied together. In the size of its skull and leg-bones it was said to be like the ordinary Inca Dog of the collie-like type, but clothed with unusually long hair, especially on the feet and tail. The hair is described as of a dull yellow. This dog must have been very similar to the Long-haired Pueblo Dog previously mentioned as discovered by Messrs. Guernsey and Kidder in excavations at Marsh Pass, Arizona.

PATAGONIAN DOG.

Characters.—A medium-sized dog, as big as a large Foxhound, coat usually short and wiry, or longer and of softer texture; ears short and erect; color dark, more or less uniform, rarely spotted; dark brownish black, dark tan, or occasionally black; tail bushy. General appearance like a small Wolf.

Distribution.—Found among the Foot Indians of the eastern parts of Tierra del Fuego, northward into Patagonia, the northwestward limits of distribution not clearly known.

Remarks.—Hamilton Smith (1840, p. 213) quotes a letter from Captain Fitzroy of the BEAGLE, that the Patagonian Dog is strong, about the size of a large Foxhound, coat short and wiry, though sometimes soft and long, like that of a Newfoundland Dog. In color it is dark, nearly uniform, rarely spotted. It is wolfish in appearance, somewhat resembles the Shepherd Dog, will growl and bark loudly.

It is doubtless a dog of this breed that is meant by Furlong in his statement that of the two types of dogs found among the Onas of Tierra del Fuego, one is like a Wolf.

Cunningham (1871, p. 307) mentions that while near Gente Grande Bay, Sandy Point, in the Strait of Magellan, three dogs wandered about in the neighborhood of his landing party, "barking and howling dismally. The first was very much like a fox in size and general appearance, and of a reddish-gray colour; the second had a piebald smooth coat, with drooping ears; while the third was clothed with long dark brownish-black hair, had erect ears, and presented a marked resemblance to a small wolf." The first was probably a Fuegian Dog, obtained through intercourse with tribes of the western part of the Magellanic Archipelago; the second was possibly a mongrel European dog; the last perhaps a Patagonian Dog.

Of this animal, Spegazzini (1882, p. 176) writes that it differs greatly from the Fuegian Dogs of the Canoe Indians, "y para mí serian ó

cruza ó descendientes directos del lobo-colorado ó gran zorro-colorado." It is difficult, however, to see any ground for deriving it from the peculiar Pampean Wolf. It is much larger than the Fuegian Dog, and is described by Spegazzini as tall, slenderly built, with fierce eyes; long-haired and bushy-tailed; the color prevailing dark tan, but occasionally black; rather silent, not barking though giving voice to melancholy howls.

Fitzroy (see Hamilton Smith, 1840, p. 215) particularly describes a dog seen near the Strait of LeMaire. No temptation would induce its master to part with it. It was the size of a large setter, with a "wolfish appearance about the head, and looked extremely savage. Behind the shoulders it was quite smooth and short-haired, but from the shoulders forward it had thick rough hair," giving it a lion-like appearance, "of a dark grey colour, lighter beneath, and white on the belly and breast; the ears were short but pointed, the tail, smooth and tapering;" the fore quarters very strong but the hinder appearing weaker. The short-haired tail seems unnatural for a Patagonian Dog, and may have been evidence of a strain of blood from a European source.

The eastern Fuegians or Onas, are considered by ethnologists to be derivatives of the Patagonians, and no doubt originally had these dogs from their mainland relatives, or brought them at the time when they colonized the Fuegian country.

It is unfortunate that no bones or figures of the Patagonian Dog are available for comparison. Ihering (1913) has, however, recorded the skull of a prehistoric dog from Amaicha, Tucuman province, northwestern Argentina, which may represent it, and at the same time indicate nearly its northern range. This skull was 190 mm. in total (?occipitorostral) length, the upper fourth premolar 19 mm., the combined upper molars 20 mm., hence a somewhat larger breed than the Inca Dog.

The native Patagonian Dog is not to be confused with the dogs introduced by Europeans, that have since become feral on the pampas of southern South America. These, according to various writers (Rengger, 1830; Hamilton Smith, 1840; Rasse, 1879) are mongrel of several breeds, notably one like the Great Dane. They are said to go in troops and to make burrows in which to shelter their young. This burrowing habit has been noticed in case of other feral dogs. Thus Coues (1876) records the case of a brindled cur that became feral, and took up its habitation in a burrow on the open prairie, near Cheyenne, Wyoming, and in this den had a litter of five puppies.

Fitzinger (1867, p. 397) applies to the feral Pampean Dog the Latin combination "*Canis domesticus, pyrenaicus albo*" (!) and briefly states that it is probably a hybrid between the Pyrenian Dog and the Bulldog. Hamilton Smith (1840) had previously described it under the Latin name *Canis campivagus*.

As to the origin of the Patagonian Dog, there is little satisfactory evidence, but it may be assumed to be a derivative of the same stock as the Inca Dog. The tooth measurements of the skull recorded by von Ihering (1913), cf. p. 477, accord very nearly with those of the largest Inca Dog of our table (p. 473), though even larger.

MEXICAN HAIRLESS DOG; XOLOITZCUINTLI.

Plate 2; Plate 3, fig. 2.

- 1651. *Lupus mexicanus* Recchi and Lynceus, *Rerum medicarum Novae Hispaniae thesaurus*, p. 479, fig.
- 1766. *Canis mexicanus* Linné, *Syst. nat.*, ed. 12, 1, pt. 1, p. 60, (based on Recchi and Lynceus).
- 1788. *Canis familiaris aegyptius* Gmelin, Linné's *Syst. nat.*, ed. 13, 1, pt. 1, p. 68 (in part).
- *Canis familiaris orthotus xoloitzcuintli* Reichenbach, *Naturg. raubth.*, p. 150.
- 1821. *Canis nudus* Schinz, *Cuv. thierreichs*, 1, p. 218.
- 1827. *Canis familiaris caraibaeus* Lesson, *Man. mammalogie*, p. 163.
- 1844. *Canis caraibicus* Tschudi, *Fauna Peruana, Therologie*, p. 249.
- 1887. *Dysodus gibbus* Cope, *Amer. nat.*, 21, p. 1126.

Characters.—A dog of medium-size, rather heavily built, and long-bodied in proportion to its height; ears large and erect; tail thick, drooping or carried nearly straight behind; hair nearly absent except for a few coarse vibrissae and generally a sparse coating on the tail, particularly near the tip; sometimes a tuft on the crown. The skin is usually pigmented, a slaty gray, or reddish gray, paler in the bends of the legs; sometimes blotched with white.

Distribution.—This race seems to have been native among the peoples of Central and South America from Chihuahua perhaps continuously southward, to the Peruvian lowlands, and in some of the Greater Antilles; it may also have been indigenous among the Indians of Paraguay.

History.—The first account of the Mexican Hairless Dog by a

European, seems to be that of Francisco Hernandez, who lived between the years 1514 and 1578. His *Historia Animalium et Mineralium Novae Hispaniae*, is printed on 96 folio pages as part of Recchi and Lynceus's *Rerum Medicarum Novae Hispaniae Thesaurus*, 1651, which was apparently intended as a monographic elaboration of Hernandez's work. This writer brought back an account of three sorts of dogs, which were in his day kept by the native Mexicans. The first of these he had himself seen, but the two others he had neither seen, nor known of their having been brought to Europe. This first sort he states, is called the *Xoloytzcuintli* and is larger than the others, exceeding three feet in body length, but with the peculiarity of having no hairy covering, yet with a soft skin, spotted with fulvous and slate color. ("Primus Xoloytzcuintli vocatus alios corporis vincit magnitudine, quae tres plerum; excedit cubitos, sed habet peculiare nullis pilis tegi, verum molli tantum, ac depili cuti, fuluo atque Cyaneo colore maculata."). The two other sorts of dogs were the hump-backed or Michuacan dog and the Techichi, elsewhere discussed. The *Xoloytzcuintli* of Hernandez is clearly the Hairless Dog, and a most elaborate account of the animal is given by Recchi and Lynceus (1651, p. 479 ff.) with a fairly recognizable figure (Plate 2, fig. 1). These authors apparently had an actual specimen, possibly one brought alive to Europe; at all events they describe its appearance as fierce and wolf-like, with a few bristly hairs about the mouth, the mammae ten as in the wolf and dog, and the vertebrae of the same number as in a dog-skeleton with which they compared it, namely seven cervicals, thirteen dorsals, seven lumbosacrals, seventeen caudals. They name the animal *Lupus mexicanus* in contradistinction to their Alco or *Canis mexicana*, which was probably a Raccoon. This name appears in zoölogical nomenclature in the twelfth edition of Linné's *Systema naturae* under the genus *Canis*. The diagnosis, evidently based on the figure and description just noticed, reads: "*C. cauda deflexa laevi, corpore cinereo fasciis fuscis maculisque fulvis variegata*"; the habitat is given as the warmer parts of Mexico. Linné's first reference is to Brisson, whose description — "*Canis cinereus, maculis fulvis variegatus*" — is clearly from the same source. Hitherto Linné's *Canis mexicanus* has been regarded as applying to the wolf of Southern Mexico, but no true wolf is known from that part of the country. Miller (1912a) seems to have been the first to question the propriety of using the name for a wolf, but leaves the matter unsettled, saying that according to E. W. Nelson, "the wolf of the southern end of the Mexican tableland became extinct

about fifty years ago" (1860). Some other name must therefore be applied to this wolf if it ever be shown to be distinct.

The above accounts by Hernandez and by Recchi and Lynceus are the basis of most of the earlier references to the Mexican Hairless Dog. Lesson, in 1827, however, redescribed it under the name *caraibaeus*, and Gmelin, earlier, 1788, had considered it the same as the Turkish or Egyptian Hairless Dog, under the name *Canis f. aegyptius*; this however, is a hairless variety of another breed.

Notes.—The former distribution of this remarkable dog is now hardly traceable with certainty except in a general way, but it was kept by the Mexicans of Chihuahua and southward, as well as by the natives of Peru, more especially those of the lower altitudes. According to Seler (1890) the Mexicans wrapped these dogs in cloths at night as a protection against cold. Some were not naturally hairless, but were rubbed with turpentine from early youth, causing the hair to fall out. On the other hand, dogs naturally hairless were raised, as at the pueblos Teotlixco and Tocilan. The Zapotec and Maya languages have separate words for the hairless dog. The term *xoloitzcuintli* is said to signify the monstrous dog. Patrick Browne (1789, p. 486) writing of the natural history of Jamaica, mentions the Indian dog as "*Canis pilis carens, minor*," a creature "frequent among the *Jews* and *negroes*" in that island; he describes it as "generally about the size of a cur-dog with a rough skin, which looks like the hide of a hog." There is nothing to indicate, however, that the breed was common in the West Indies.

In Peru, Tschudi (1844, p. 249) observed this dog mainly on the coast, since its lack of a hairy coat made it unable to withstand the cold of the higher altitudes of the interior except in the warm valleys, and then only if carefully protected. He describes it as slaty gray or reddish gray, sometimes spotted, and says it is voiceless. He is probably mistaken, however, in supposing these were the dogs found by Columbus among the Lucayans. Nearly twenty years previously, Lesson had seen the Hairless Dog in numbers at Payta, Peru.

According to Rengger (1830), a hairless dog, possibly identical with the Mexican Hairless Dog, was indigenous among the Indians of Paraguay, who had a special word — *yagua* — for it. He describes it as having a relatively small head, pointed snout, ears erect or only their tips drooping forward, rump fat, extremities fine, tail spindle-shaped and usually drooping. Some individuals do not bark, but howl only.

During the last hundred years, little attention seems to have been

given to this breed, although lately it has been taken up by dog fanciers. LeConte, in 1856, calls it the Comanche Dog, and says it is common among the Indians of that tribe, but, "though some of these dogs have been brought within the United States, we have no description of them." Packard (1885) mentions seeing one in his visit to Mexico, but they were apparently uncommon. In a recent letter from Mr. Arthur Stockdale, he states that in Mexico City they are now considered somewhat of a rarity, though said to be common in Chihuahua, where however, little attention is paid them.

There is some evidence that they do not breed readily with normally haired dogs, yet such crosses have been made, and curiously the result seems to be that about 50% of the young are naked or practically so, the other 50% fully haired. Stockdale (1917) records such a litter consisting of two puppies, one hairless, the other normal. Kohn (1911) records a mating of a Hairless Dog with a Fox-terrier, the four offspring of which comprised two naked and two completely-haired dogs. His microscopic study of the skin of the Hairless Dog indicates that its character is that of a young embryo's, whence it may be that the hairless character is merely the retention of the embryonic condition, just as the short-nosed skull of the Japanese Lap-dog seems to be a case of the retention of the embryonic proportions of the skull.

As to the origin of this breed, it is most likely a variant of the larger type of Indian Dog, in which the hairlessness is due to a retention of the embryonic condition of the skin, precluding hair development, just as the short-nosed breeds of dogs are the result of the failure of the facial bones to attain full growth.

I have unfortunately been unable to obtain skulls for comparison.

SMALL INDIAN DOG OR TECHICHI.

Plate 10.

- 1788. *Canis familiaris americanus* Gmelin, Linné's Syst. nat., ed. 13, 1, pt. 1, p. 66 (in part).
- 1792. *Canis americanus plancus* Kerr, Animal kingdom, 1, p. 136 (based on the Techichi of Hernandez).
- 1840. ?*Canis alco* Hamilton Smith, Jardine's Nat. library. Mammalia, 10, p. 135, pl. 4, left-hand fig.
- 1841. ?*Canis familiaris cayennensis* Blainville, Ostéographie. Atlas, pl. 7¹.
- 1867. *Canis caraibaeus, hernandesii* Fitzinger, Sitzb. K. akad. wiss., Wien, 56, pt. 1, p. 498.
- 1882. ?*Canis gibbus* Dugés, La naturaleza, 5, p. 14, fig. 1-3.

Characters.—A small, light-limbed dog, of rather slender proportions, narrow delicate head, fine muzzle, erect ears, well-developed tail, which may have been close-haired. Colors black, black and white, or perhaps brownish or yellowish.

Distribution.—This was perhaps the dog of fox-like appearance noticed by many of the early explorers, yet it is difficult to indicate the limits of its former distribution. On the Atlantic seaboard, among the considerable quantity of skeletal remains examined, I have seen nothing that could be referred to such a dog; yet Brereton, who reached the Elizabeth Islands and coast of southern New England with Gosnold in 1602, mentions "Dogs like Foxes, blacke and sharpe nosed" among the "Commodities" seen there. In the famous village site near Madisonville, southwestern Ohio, its bones occur and there are in the Peabody Museum similar bones from the southwest and Yucatan, believed equally to be pre-Columbian. Among the dog-skulls found with Peruvian burials the same type occurs, as well as skulls intermediate between this and other dogs, and so probably representing mongrel individuals. Probably then this type of dog was spread over at least the central and southwestern part of North America and parts of northwestern South America.

Nomenclature.—This is assumed to be the Techichi of the early Spanish accounts of Mexican dogs, though there is little doubt that two different animals as well as more than one breed of dog were confused under this title by the early writers and systematists. It is of some importance, therefore, to examine their accounts carefully since the case is somewhat complex and involves the identity of the Alco of early writers. Both Gmelin and Kerr based their names on the account of Recchi and Lynceus (1651, p. 466), who in turn refer to Hernandez's brief account (which they print), in the *Historiae animalium et mineralium Novae Hispaniae*, page 7. Hernandez who died in 1578, had visited Mexico, and in his enumeration of its animals includes three sorts of native dogs. The first of these is unquestionably the Mexican Hairless Dog, and as he himself states, was the only one he saw personally ("caeteros verò neque conspexeram, neque adhuc eo[i. e. ad Europam] delatos puto").

His account of the two other dogs is important and reads:—"Secundus Melitensibus canibus similis est, candido, nigro, ac fuluo colore varius, sed giberosus, gratusque iucunda quadam deformitate, ac capite velut ab humeris edito, quem Michuacanensem abora vnde est oriundus vocare solent. Tertius verò nuncupatus Techichi, Catulis similis est nostratibus, Indis edulis, tristi aspectu, ac caetera

vulgaribus similis. Atque haec de canibus Nouae Hispaniae breuiter dicta sunt." Translated freely, "The second is like the Maltese dogs, in color varied with white, black, and fulvous, but it is hump-backed and prized for this pleasing deformity, and a head that appears to grow from the shoulders. It is called the Michuacan dog from the place where it is native. The third sort of dog, however, is called Techichi, and is like our Spaniels, but of sad countenance, though in other respects like ordinary dogs. It is eaten by the Indians. This then is briefly what I have to say of the dogs of Mexico." The Techichi apparently was in no wise peculiar as a small dog. The Michuacan animal, however, was hump-backed, without conspicuous neck, its colors white, black, and fulvous, "varius." In their elaboration of Hernandez's account, Recchi and Lynceus (1651, p. 466) fail to distinguish between these two supposed dogs; at all events their figure (Plate 3, fig. 1) and description deal altogether with the hump-backed animal, of which they seem to have had some knowledge or probably a preserved specimen. They figure a female under the name '*Canis Mexicana*' and the Mexican name *Ytzcuinteporzotli*, the first half of which signifies 'dog.' Buffon, and later Gmelin, likewise failed to distinguish between Hernandez's second and third sorts of dogs, and the latter author in 1788, combined the two under the name *Americanus*, with a brief diagnosis based on the figure of Recchi and Lynceus, viz., "magnitudine *ι* [*i. e.* of the breed *melitaeus*], capite parvo, auribus pendulis, dorso curvato, cauda brevi." Under this name, Gmelin included: a. *Ytzcuinteporzotli*, or the *Canis mexicana* of Recchi and Lynceus and b. Techichi of Hernandez. Obviously the diagnosis applies to the hump-backed animal only, to which Buffon had already applied the native name Alco, following Recchi and Lynceus. This name appears to have been of doubtful application to the common dog, but was used at times by later writers to indicate the small native dog of Peru and Mexico. Kerr (1792, p. 136) endeavors to improve on Gmelin by distinguishing with Latin names the two varieties of the latter's *Canis americanus*. He first transcribes the description and then distinguishes: "a. Fat Alco. — *Canis americanus obesus*" and "b. Techichi. — *Canis americanus planus*," with descriptive accounts from Hernandez and his elaborators, corresponding to Gmelin's "a" and "b."

What then was this Alco? A study of Recchi and Lynceus's figure (Plate 3, fig. 1) and description seem to indicate clearly that they had in mind a Raccoon. They describe its nose, forehead, and eyebrows as white, these markings evidently delimiting the dark face,

while the peculiar and characteristic upward slope of the back in the live animal is thus described: "Dorsum cameli instar gibbosum, post collum subito ad pectus acclive, sed coxas versus declive." The tail is said to be short, barely reaching the heel, the mammae six in number. They further note its very fat belly, beautifully covered with thick black hair varied with spots; feet and shanks whitish, claws strongly exerted. These characteristics recall the Raccoon more than any other animal. There are, however, eight mammae in this animal, and the ears are not pendulous as described, but these discrepancies may be due to inaccuracy of observation, or the condition of the specimen (perhaps a preserved hide) which the authors seem to have had. The account quoted from Acosta (1590, p. 277) doubtless refers to the same animal and not to a dog. This author, in his *Historia natural y moral de las Indias*, writes: — "Verdaderos perros no los auia en Indios, sino unos semejantes a perrillos, que los Indios llamauan Alco: y por su semejana a los que há sido lleuados de España, tambien los llaman Alco: y son tan amigos destos perrillos que se quitaran el comer, por darselo: y quando van camino, los lleuan consigo acuestas, o en el seno." (Of real dogs there are none in the Indies, save certain animals resembling little dogs, which the Indians call Alco; and on account of their resemblance to our dogs brought here from Spain, the Indians call these Alco as well: and so fond are they of their little dogs that they deny themselves of food in order to give it to them; and when they go on a journey they carry the little dogs with them on their shoulders or in their arms). The Raccoon rather than a small dog seems to be indicated here, and the habit of carrying them about on journeys would perhaps account for the present-day anomalous distribution of the small species of raccoon in Central America (Panama) and in the islands of Cozumel, Guadeloupe and New Providence. Acosta's story may also explain the transference of the name Alco to small dogs, though Philippi (1886) says this means dog in the Quichua tongue.

An early mention of the tame Raccoon is found in Hakluyt's *Voyages*, in A relation of the commodities of Nova Hispania, and the maners of the inhabitants, written by Henry Hawkes merchant, which lived five yeeres in the sayd countrey, written in 1572. He says: "Their dogs are all crooked backt, as many as are of the countrey breed, and cannot run fast: their faces are like the face of a pig or a hog, with sharpe noses."

If Gmelin's name *americanus* be admitted as applying to a Raccoon it would antedate Wagler's name *hernandezii* (1831) for a Mexican

Raccoon. In view, however, of the uncertainty as to which form of Raccoon it should indicate, there seems to be no virtue in making such a change at present.

Later writers have tried to discover living examples of the original Alco with small success. Hamilton Smith (1840, p. 135, pl. 4, left-hand fig.) describes as *Canis alco*, what he supposed to represent this breed, from a stuffed specimen in an exhibition of Mexican curiosities made by W. Bullock, and said then to be in the Egyptian Hall (British Museum). He says of it: "That enterprising traveller described it as of the wild race; yet, from its appearance, we at first considered it to be a Newfoundland puppy." The figure shows a small black and white dog with rather full-haired tail, clumsy build, and ears laid back. Of the mounted specimen, Hamilton Smith further writes:—"It was small, with rather a large head; elongated occiput; full muzzle; pendulous ears; having long soft hair on the body. In colour, it was entirely white, excepting a large black spot covering each ear, and part of the forehead and cheek, with a fulvous mark above each eye, and another black spot on the rump; the tail was rather long, well fringed, and white." This description, except for the pendulous ears might apply well enough to the type of small dog here treated. How much of its appearance was due to the taxidermist's efforts is, however, to be considered. It is even possible that it was after all only a spaniel, which, except for its short ears, it seems to resemble.

What seems to have been a slightly deformed Indian Dog, is described and figured by Dugés (1882) as a Chihuahua Dog (a term that is used by fanciers for a dwarf breed, with erect ears). From his figure of the skull, it is evident that the animal was young. It was apparently rather small, had but three lower premolars (the first lacking), a rather heavy head, and long close-haired tail. The back seems to have been unduly arched but the head is represented as erect, and the posture quite different from that of a raccoon. The color was blotched black and white. The ears were cropped, but were assumed to have been erect. So far as can be judged from Dugés's account, this may have been a dog similar to the Techichi. He, however, supposed it to represent the Alco.

The confusion of names has been added to by Cope (1887) who examined three skulls of the so called Chihuahua Dog. He found a variable reduction in the number of teeth, correlated apparently with the loss of hair. The premolars were reduced to $\frac{2}{3}$ or $\frac{3}{3}$, while the molars were $\frac{0}{2}$, $\frac{1}{2}$, and $\frac{2}{2}$ respectively. In all, the inner cusp of the lower sectorial was lacking. On account of the reduced number of

molars, and this character of the sectorial, Cope refers this breed to his genus *Dysodus* (Cope, 1879, 1879a) based on the Japanese Lapdog, adding that "the species may be called *Dysodus gibbus*," for "the Chihuahua dog is the *Canis gibbus* of Hernandez." The animal to which Hernandez applied the adjective "*giberosus*," however, was with little doubt a Raccoon.

Skeletal Remains.— Among a great number of bones of Indian dogs examined, from mounds, burials, or refuse deposits in various parts of America, there occur skulls or fragments of jaws appertaining to a wholly different type of dog from the large varieties just described. The remains indicate a small light-limbed animal, with slender muzzle abruptly narrowed in front of the third premolar. Although the surface of the brain-case in adults is roughened for muscular attachment the sagittal crest does not develop till old age. All the teeth are small (upper carnassial 14–16.5 mm. in length), the nasals long, and the skull normal, in that it seems not shortened or broadened in any way, the teeth not crowded. A transverse line at the end of the palate falls about through the middle of the second molar. These dogs are probably the third variety of Hernandez, the Techichi or Small Indian Dog. Several skulls, more or less imperfect, from the Madisonville, Ohio, village site are referred to this breed, though their measurements are a very little larger than those of more southern specimens. They occur here together with bones of the large type of Indian Dog. An imperfect cranium (M. C. Z. 7,123) collected many years ago in McPherson's Cave, Virginia, by Lucien Carr, is apparently in every respect similar to a skull of this type from Pecos, N. M., obtained by Dr. A. V. Kidder in the course of excavating a village site. A similar but slightly smaller, though adult, skull from Pueblo excavations in the southwest is practically the same, as is also a skull of the Papago Indian Dog obtained by the late Dr. Edgar A. Mearns at Sonoyta, Sonora, while on the Mexican Boundary Survey. It is not fully adult, though of nearly mature dimensions. What seems to be a dog of this type is represented in the Peabody Museum by a cranium and hind leg-bones from Labna, Yucatan; the rostrum is damaged and the teeth lost except the carnassial. The long slender limb-bones are in strong contrast with the short thick bones of the Short-nosed Indian Dog.

Turning now to South America, the Museum has a cranium from Surinam, labeled:—Carib Indian Dog. It was received through the Boston Society of Natural History from the Wyman Collection, and was probably collected by Dr. F. W. Cragin, some fifty years ago

Though it has acquired the adult dentition, it is not old, and the temporal ridges have not yet united to form a crest. A very similar skull from French Guiana is figured by Blainville (1841) under the name *Canis familiaris cayennensis*, by which he seems to have intended to name the native dog.

I am indebted to Dr. W. C. Farrabee for a photograph, (Plate 5, fig. 2) which is assumed to illustrate this dog. It was secured by him while studying the Macusi tribe in southern British Guiana, and shows an old dog, and a puppy, accompanying a child of the tribe. The larger dog has a narrow head, and erect ears, the tips of which have been cropped, probably as a propitiation to evil spirits; the body is short in proportion to the lean limbs, the tail (better seen in the picture of the puppy) is long, upcurving, and like the body, short-haired. Dr. Farrabee writes that these dogs "are small, yellow and white, or brindle and white, and may be very much mixed with European dogs." Of their ancestry, however, there is no evidence, though the erect ears and slender proportions favor the supposition that they retain a measure of their aboriginal character. The expression of the larger dog recalls the "tristi aspectu" of Hernandez's description of the Techichi. It is not unlikely that the small dogs found by the Jesuits among the Indians of the southern Antilles and parts of Colombia and Central America may have been of the breed here described.

Dr. Farrabee writes me further concerning some larger dogs which he saw among the Wanoai tribe "who occupy the Akarai Mountains, northern Brazil to southern British Guiana. This tribe, on the Brazil side had never seen white men before [his visit]. They have the best dogs of all the tribes visited and they take the best care of them. These dogs are noted among the tribes a month's journey away. They keep the dogs tied on raised platforms and allow them exercise morning and evening. The dogs are all black and white and of good size." A small photograph of these dogs shows a hound-like aspect and drooping ears. They are probably of European origin and perhaps the same as the dogs mentioned by Bancroft (1769, p. 140) who says: "The Dogs of *Guiana* seem to be of a species between the Hound and Land-Spaniel: their make is slender, their ears long and pendulous, with a blunt nose, and large mouth: their bodies are covered with long shaggy hair, generally of a fallow colour. They pursue and start the Game by the scent."

I am indebted to J. Rodway, Esq., of the Museum at Georgetown, British Guiana, for a brief note on the hunting-dog of the present-day

Indians of that country. He considers that it is of undoubted European origin, "has no particular characters," and "could be matched in any lot of mongrels. It is generally rather small with a pointed muzzle, foxy looking, and kept hungry to prevent laziness." The "foxy" appearance is somewhat typical of the native breeds of smaller Indian dogs, a result of the fine muzzle, ample erect ears, and drooping tail, traits which seem still traceable among these mongrels of the modern Guiana Indians.

Among a series of dog-skulls (belonging to the U. S. N. M.) from ancient burials in Peru are two which in their small size and slender proportions seem referable to the Techichi. Both are fully adult, with a well-developed sagittal crest on the interparietal, extending forward in the larger skull on to the parietal suture. As will be seen from the table of measurements appended these skulls are a very little larger, with slightly shorter nasals, as compared with the other skulls whose dimensions are given. It is possible that this is due to some admixture with the short-nosed breeds. Nevertheless the skulls in question are quite different from the latter in their slender and narrow outlines, and unshortened tooth-row.

No doubt, did we know the external characters of the dogs whose skulls are here listed, it would be possible to recognize more than one breed. Thus the Ohio individuals are a trifle larger in dimensions than those of the Southwest and the Peruvian dogs again are a little larger. Yet all are clearly of the same general type.

A comparison of the skulls and measurements of these specimens with those of the *Canis palustris* of Rütimeyer from the Swiss Lake-Dwellings of late Neolithic to Bronze times in Europe, reveals a rather close correspondence which is probably more than accidental, and may even indicate a derivation from some common Asiatic stock at a very early period. The type of small dog of the Swiss Lake-Dwellings was one apparently of general distribution in southern Europe during the Neolithic time, and Woldrich (1886a) has identified it as far north as Denmark in the kitchen-middens. It was apparently, on the average, of wider zygomatic breadth, but otherwise its dimensions corresponded very closely. This evidence favors the view that a dog of this type was one of the earliest to be domesticated and was of wide distribution in an early period of human culture. Remains of a larger type of dog, *C. intermedius*, are also wide-spread in late Neolithic or Bronze culture layers of middle Europe, and correspond broadly to the larger type of Indian dog, a parallelism that is suggestive of the common origin of the large and the small types of dogs in Europe and America, probably from Asiatic prototypes.

Cranial Measurements	Ohio: Madisonville P. M. 67,700	Pueblo Indians P. M.	Va.: Lee Co. M. C. Z. 7,123	N. M.: Pecos M. C. Z. 9,520	Sonora: Sonoyta U. S. N. M. 63,169	Surinam M. C. Z. 10,844	Peru: Chicama U. S. N. M. 172,861	Peru: Coyungo U. S. N. M. 176,387	Yucatan: Labna P. M.
Alveolus of i^1 to occipital condyle	—	132	140	138	142	137	139	145	—
“ “ “ “ median edge of palate	—	71	74	74.5	76	73	74	78	—
Alveolus of i^1 to orbit	67	61	63	64	64	62	61	62	—
“ “ “ “ alveolus of molar ²	80	74	77	77.5	77	76	76	80	—
“ “ c “ “ “ m^2 . . .	67	61	63	65	64.5	64	63	65	—
“ “ p^1 “ “ “ m^2 . . .	54	49	51	52	51	50	51.5	49	—
“ “ p^2 “ “ “ m^2 . . .	47	42.5	46	47	46	45	45	43	—
“ “ m^1 “ “ “ m^2 . . .	17	—	14	16	15	14	16	16	—
Length of upper carnassial, p^4 . . .	16.6	14.5	14.3	15.5	15	14	16.3	16	16
Median length of nasals	—	—	—	48	49	47	45	45	44
Width across occipital condyles . .	—	—	29	31	29	33	31	32	—
“ “ palate at m^1	52.5	53	51	51	47	47	55	56	—
“ “ supraorbital processes	43	41	—	39	—	40	42	46	—
“ “ zygomata	—	84	83	84	82	77	90	—	78
Lower jaw, alveoli i_1 to m_3	—	—	—	79	79	—	—	—	—
“ “ “ c to m_3	—	76	—	74	74.5	—	—	—	—
“ “ “ p_2 to m_3	—	59	—	58	57	—	—	—	—
“ “ “ p_3 to m_3	—	—	—	49	48.5	—	—	—	—
“ “ “ p_4 to m_3	—	—	—	40	39	—	—	—	—
“ “ “ m_1 to m_3	—	—	—	32	30	—	—	—	—
Length of m_1	—	18.5	—	18	17.5	—	—	—	—
Skeletal Measurements									
Femur	—	—	—	—	—	—	—	—	128
Tibia	—	—	—	—	—	—	—	—	130

Early Accounts.—Hernandez disposes of the Techichi in few words, as being the third sort of dog he knew to be found in Mexico. It must have become scarce by his time (about 1578) as he had not seen it himself but describes it thus:—“Catulis similis est nostratibus, Indis edulis, tristi aspectu, ac caetera vulgaribus similis” (similar to our spaniels, eaten by the Indians, of melancholy visage, but otherwise like the common dogs). J. Jonstonus, writing in 1657, includes in his account of dogs, a transcription of Hernandez’s passage as to

the three sorts of dogs in Mexico. He adds further that the Indians of Cozumel Island ate these dogs as the Spaniards do rabbits. Those intended for this purpose were castrated in order to fatten them.

Clavigero, the historian of early Mexico, wrote that the breed was extinct in his time, due, as he supposes, to the Spaniards' having provided their markets with them in lieu of sheep and cattle.

Possibly this breed of dog is the one mentioned in De Soto's relation of his march through Florida. At one place the cacique of the village sent him a present including "many conies and partridges . . . many dogs . . . which were as much esteemed as though they had been fat sheep." At another place, "the Christians being seen to go after dogs, for their flesh, which the Indians do not eat, they gave them three hundred of these animals." Again, at a small Indian village called Etocali, the expedition got "maize, beans, and little dogs, which were no small relief to the people."

As late as 1805, Barton (1805, p. 12) who had made special inquiry of William Bartram, as to the dogs of the Florida Indians, quotes him, that the latter had in addition to the larger dogs, a smaller breed, about the size of a fox, which probably was of the type under discussion.

It is probably this dog, if not also the short-nosed variety, that figures largely in the mythology of the Mayas of Yucatan. Among several representations of the dog in the Mayan codices are seen short-nosed and long-nosed heads, but whether these really indicate different breeds of dogs or different artists that made them cannot be determined. All are shown with erect, sometimes with cropped ears, a tail that is of medium length, usually shaggy, and recurved. Black patches are commonly represented on the body, and the eye of the dog often centers in a black area. Seler (1890) speaks of its use as a sacrificial animal in Yucatan, sometimes in place of a human being. Placed in the grave, the dog carried its master's soul across the "Chicunauhapan" or nine-fold flowing stream. According to Sahagun, some were black and white, others dark red, and there were short-haired and long-haired dogs, but he does not state whether the small and the large types of dogs each had short-haired and long-haired varieties. A brief summary of the significance of the dog in the religious life of the Mayas is given by Tozzer and Allen (1910, p. 359).

HARE-INDIAN DOG.

Plate 1, fig. 2.

1829. *Canis lagopus* Richardson, Fauna Boreali-Amer., 1, p. 78, pl. 5 (not *Canis lagopus* Linné, 1758, q. e. Alopex).

1867. *Canis domesticus, lagopus* Fitzinger, Sitzb. K. akad. wiss. Wien, 56, pt. 1, p. 407.

— *Canis familiaris orthotus lagopus* Reichenbach, Regn. anim., pt. 1, p. 13.

Characters.— A small, slender dog, with erect ears and bushy tail, feet broad and well-haired. Color white with dark patches.

Distribution.— Formerly found among the Hare Indians and other tribes that frequented the borders of Great Bear Lake and the banks of the Mackenzie River.

Description.— This seems to have been a small dog, of the Techichi type. Richardson, who gave a figure and description of it from first-hand acquaintance, characterizes it as slightly larger than a fox but smaller than a coyote, and apparently of rather slender proportions. The head was small with sharp muzzle, erect thickish ears, somewhat oblique eyes; the tail bushy and sometimes carried curled forward over the right hip, though this does not appear in Richardson's figure; foot broad and well-haired. He describes an individual as having the face, muzzle, belly, and legs white; a dark patch over the eye, and on the back and sides, larger patches of dark blackish gray or lead color, mixed with fawn and white. Ears white in front, the backs yellowish gray or fawn; tail white beneath and at the tip.

Notes.— It seems probable that this small breed was lost in the early part of the last century. At all events, writers subsequent to Richardson do not seem to have met with it, and those that mention it, seem to have confused it with the Common Indian Dog. Thus B. R. Ross (1861) and Macfarlane (1905, p. 700) clearly had in mind a different animal; and a skull sent by the latter to the U. S. N. M. as *lagopus* (from Fort Simpson, Mackenzie River) is a large dog, evidently the Common or Larger Indian Dog. Hamilton Smith (1840, p. 131) takes his description in part from Richardson, and mentions a pair of these dogs as then living in the Zoölogical Society's Gardens at London. Audubon and Bachman likewise are indebted to Richardson for their account, though their figure, by J. W. Audubon, is said to be from a stuffed specimen, perhaps one of those previ-

ously living in the Zoölogical Society's Gardens. The dimensions they give however, seem rather large.

Richardson says further that it was used solely in the chase and was probably too small to serve as a burden carrier. Its voice was a wolf-like howl, but at some unusual sight it would make a singular attempt at barking, commencing with a peculiar growl and ending in a prolonged howl.

Here may be mentioned what seems to be an unknown or vanished breed of dogs as indicated in the account of Frobisher's voyage to Arctic America in 1577. At the present Frobisher Bay, in southeastern Baffin Land, the expedition found in addition to the large dogs used for sledging, a smaller breed, which was apparently used only as food, and allowed the freedom of the skin tents of the Eskimos. The historian of the expedition writes that they "found since by experience, that the lesser sort of dogges they feede fatte, and keepe them as domesticall cattell in their tents for their eating, and the greater sort serve for the use of drawing their sleds." At York Sound, the same writer relates that on going ashore to examine "certaine tents of the countrey people," they "found the people departed, as it should seeme, for feare of their comming. But amongst sundry strange things which in these tents they found, there was rawe and new killed flesh of unknowen sorts, with dead carcasses and bones of dogs" (Hakluyt's Voyages, Everyman's Library, ed. 5, p. 212, 215). Concerning this "lesser sort of dogges," nothing further seems to be known, whether they were a dwarf variety of the Eskimo dog, or as seems likely, a small breed similar to those of the Hare Indians or of other tribes of the mainland.

FUEGIAN DOG.

Plate 4, fig. 2.

Characters.—Size small, as large as a terrier, muzzle slender, ears large, delicate, and erect, body and limbs well-proportioned, shoulders higher than rump; tail long, drooping, slightly recurved at the tip and well-fringed; feet webbed; color uniform grayish tan, or often with patches of black or tan, and areas of white; inside of the mouth dark-pigmented.

Distribution.—Found chiefly among the "Canoe Indians" — Yahgans and Alacalufs — of the Fuegian Archipelago, from Cape Horn to Beagle Channel, and northwestward, probably at least to the western part of Magellan Strait.

Descriptions.—The best account of the Fuegian Dog is that given by d'Herculais (1884) of two Yahgan Dogs brought back to France by Dr. Hyades of the Mission scientifique au Cap Horn (expédition de la ROMANCHE), in 1883. These were obtained as puppies from the Yahgans at Orange Bay and grew up to be tame and affectionate dogs. They are described as small but well-proportioned, remarkable for their large pointed and erect ears, and very sharp slender muzzles. The color-pattern is very variable, often a uniform grayish tan recalling the jackal; again, the body is marbled with extensive black or tan areas on a white ground. The feet are plainly webbed. The two dogs above referred to, were said to measure, the male and female respectively:—height at shoulder, 49 and 44 cm.; length from tip of nose to root of tail, 80 and 72 cm.; length of tail, 26 and 23 cm.

External Measurements.—Dechambre (1891) in a note on these same dogs, gives the following dimensions, evidently of a female:—

Scapuloischial length.....	52	cm.
Height at shoulder.....	41	"
Height at rump.....	39	"
Height at axilla.....	25	"
Thoracic perimeter.....	58	"
Distance between ears.....	9	"
" " inner corners of eyes.....	4.5	"
" " outer " " ".....	8.5	"
Breadth of forehead.....	11	"
Length of head.....	22	"
" " muzzle.....	9	"
Interorbital width at outer corner of eye.....	9.5	"

The further description by Dechambre supplements that of d'Herculais based on the same individual. He describes its fox-like head with pointed muzzle, broad forehead, its erect and high-set ears, usually directed forward, very mobile; eyes slightly oblique. The body is large, limbs slender, the neck short and powerful, the shoulders slightly higher than the rump; tail bushy and carried high. Pelage with a short under fur, pied black and white, passing to slaty at the throat, clouded with tan; over each eyebrow a white spot with a few fulvous hairs. The coat has the appearance of a domesticated animal in its pattern.

Captain Fitzroy of the BEAGLE, in a letter to Hamilton Smith (1840, p. 214) describes these dogs of the 'Canoe Indians' as resembling "terriers, or rather a mixture of fox, shepherd's dog, and terrier. All

that I examined had black roofs to their mouths, but there was much variety in the colours and degrees of coarseness of their coats. * * * Many Fuegian dogs are spotted and not a few have fine short hair, but all resemble a fox about the head. * * * One brought from Tierra del Fuego was white with one black spot, and very handsome; his size was about that of a terrier, his coat short but fine, and his ears extremely delicate and long, although erect;" the muzzle also is long, the tail rough and drooping.

Skull and Limb-bones.—In a recent paper, Professor Lönnberg (1919) has given what appear to be the first published figures and measurements of the limb-bones and skull of this dog. His specimen was a skeleton obtained by Nordenskjöld in 1895–96 during his Tierra del Fuego expedition. As this author demonstrates, the skull is that of a true dog, and shows no relationship with the native canid, *Pseudalopex lycoides*. A comparison of the cranial measurements with those given for the Techichi of North and South America, shows a very close approximation, amounting almost to identity. The first lower molar in the Fuegian Dog seems smaller, however, 16.5 mm. in Lönnberg's specimen against 17.5 to 18.5 mm. in the more northern dogs. For better comparison, the following measurements of the Fuegian Dog are reproduced from this paper (Lönnberg, 1919, p. 11):—

Condyllo-incisive length	141	mm.
Length of palate	71.3	"
Front of canine to back of m^2	64	"
Length of premolar ⁴	15.2	"
Length of upper premolar-molar series	51	"
Width of palate outside m^1	52.6	"
Zygomatic width	81	"
Length of nasals mesially	46	"
Length of lower m_1	16.5	"
Length of humerus	105	"
Length of ulna	125	"
Length of femur	132	"
Length of tibia	139	"

Uses.—The Fuegian Dog is active and strong in proportion to its small size; quiet, faithful to its master, and able to withstand much privation; vigilant and extremely sly. It is capable of barking like the European dogs.

They are of invaluable service to their masters in hunting, particularly in the pursuit of otters (*Lutra felina*), which are assiduously

sought. Indeed Fitzroy wrote that "it is well ascertained that the oldest women of the tribe are sacrificed to the cannibal appetites of their countrymen rather than destroy a single dog. 'Dogs,' say they 'catch otters; old women are good for nothing.'" They are vigilant watch-dogs, barking furiously at a stranger. Their small size, and consequent adaptability as canoe companions, are no doubt the chief cause for their preference by the Canoe Indians of the west Patagonian Archipelago, over the larger dogs found among the so-called Foot Indians of the mainland and the eastern and inland parts of Tierra del Fuego.

Remarks.—In the absence of specimens for comparison, it is not altogether clear that the Fuegian Dog can be satisfactorily distinguished except in minor particulars from the Techichi or Alco of Peru and Mexico. Molina apparently thought it identical. In general it appears closely similar, but perhaps of more slender build, a bushier tail with recurved tip, well-palmated feet and a shaggier coat, though Fitzroy speaks of variation in this last character.

In his Bibliography of the Fuegian tribes, Cooper (1917, p. 186) has summarized the references to dogs in the literature referring to these people. As early as 1557, or perhaps 1553, the Chonos at the northern end of the Chilian Archipelago, were credited with having dogs, as appears from Goicueta on the authority of Cortés Hojea. The first mention of dogs in the Strait of Magellan appears to be that of Narbrough, who in 1670, found the natives of the Elizabeth Islands in possession of large mongrel dogs of several colors. He compared them to the race of Spanish dogs he had found among the Patagonians of Port Julian. Probably these were not of native stock. Twenty-six years later de Gennes saw five or six small dogs among the Alacalufs of Port Famine. The Mánekenkn met by the first Cook expedition in 1769 at Good Success Bay, southeast end of Tierra del Fuego, had dogs about two feet high with sharp ears; they all barked. The small dog here described is apparently found among the so-called Canoe Indians of the western archipelago, the Yahgans and Alacalufs, the most southerly tribes of men in the world.

SHORT-NOSED INDIAN DOG.

Plates 6, 11.

1885. *Pachycyon robustus* J. A. Allen, Mem. M. C. Z., 10, 13 pp., 3 pls.

1885. *Canis ingae vertagus* Nehring, Sitzb. Gesellsch. naturf. freunde Berlin, p. 5-13 (not *Canis familiaris vertagus* Linné, Syst. nat., 12th ed., 1766, 1, p. 57.

Characters.—A stoutly built dog, the size of a small terrier, with erect ears, short heavy muzzle, high forehead, short body and limbs, well-developed tail.

The color seems to have been black and white; sometimes more uniformly black, or yellowish with dark blotches.

The skeleton is stoutly proportioned, the limb-bones short and thick, the humerus with a very small or no olecranal perforation. The sagittal crest is chiefly developed at the occiput. Correlated with the slight reduction of the maxillary bones, and the widening of the palate, is the fact that the last molar is placed just in advance of a transverse line through the posterior boundary of the palate.

Distribution.—Skeletal remains of this peculiar small dog have been found in Virginia in a superficial cave-deposit, as well as in the shell-mounds of San Nicolas Island on the coast of southern California. A well-preserved dried or mummified example was lately discovered by Mr. S. J. Guernsey in a burial antedating the Cliff Dwellers, in the Marsh Pass region of Arizona; and Reiss and Stübel have discovered its mummified remains in the prehistoric necropolis of Ancon, Peru (see Nehring, 1884b). In the M. C. Z. is a humerus lacking the epiphyses, of a young specimen from Pecos, New Mexico, obtained by Dr. A. V. Kidder. These localities may be taken as limiting the known extent of its distribution.

Notes.—In 1885, Dr. J. A. Allen described as a new genus and species *Pachycyon robustus*, an extinct type of dog from Ely Cave, Lee County, Virginia, basing his account upon a pelvis, a femur, a tibia, a scapula, and a humerus of which he publishes excellent illustrations. These bones were obtained in the course of excavating the superficial layer of earth on the cave-floor, and though it is not certain exactly at what point they were found, no excavations deeper than a foot were made. Remains of Indian occupation were numerous, and other bones were obtained in the cave. There is nothing to indicate great age in the type-specimens (M. C. Z. 7,091); indeed the bones are quite fresh in appearance, only slightly discolored with earth. They are chiefly notable for their small size and rather heavy ungraceful proportions, while the humerus is particularly marked on account of its lacking the usual perforation over the middle of the epicondyle. This perforation is almost always present in Eurasian dogs, as well as in coyotes and wolves. No further light has since been shed on the nature of this animal nor have any parts of its skull been found.

Among the remarkable discoveries made by Mr. S. J. Guernsey in the course of archaeological exploration in the Marsh Pass region of

Arizona for the Peabody Museum, were the dessicated remains of two dogs with human burials of an age apparently antedating the culture of the Cliff Dwellers. One of these dogs is small, about the size of a Fox-terrier but more compactly and heavily built, with a shorter head, erect ears, and longer tail. It still shows a black and white pattern, with a narrow median white line from nose to forehead, a white chin, throat, and belly, a white collar, white feet, and tail tip. Much of the body is black. In the length of the limb-bones and pelvis as nearly as can be determined from careful study of the dried and mummified specimen, it corresponds exactly with *Pachycyon*. By making incisions through the dried tissue at the elbow, it was possible to lay bare the olecranal cavity above the joint where the large perforation is usually present. It was found that in the right humerus a small perforation was present, about 3 mm. in diameter, while in the left humerus there were merely two small pores side by side. The animal was young, still retaining a milk incisor, and so it is likely that had it been as old an individual as the one whence the type-bones of *Pachycyon* were derived, these foramina would have ossified completely, perhaps leaving, as in the type-humerus, a shallow pit in the posterior side of the olecranal fossa, as an indication of the former perforation. So complete is the correspondence of the bones of *Pachycyon* with those of this prehistoric dog of Arizona that they may be unhesitatingly pronounced those of a similar if not identical breed of Indian dog.

Not less interesting is a comparison of the humerus of *Pachycyon* with a humerus figured by Nehring (1884b, Plate 118, fig. 4, 4a) from a mummified dog exhumed with human-mummies in the ancient necropolis of Ancon, Peru. In measurements, there is practical identity as shown in the following table (the measurements of the Ancon humerus are taken directly from Nehring's figure, of natural size): —

	<i>Pachycyon</i>	Ancon
Greatest length of humerus	97 mm.	97 mm.
Greatest diameter through head of humerus	31.5	29.5
Transverse " " " " "	21	24
Transverse diameter of distal end of same	25	25

Nehring's figure shows substantially the same type of thick stout humerus, and as he remarks, has the further peculiarity of lacking any trace of perforation of the olecranon fossa. It should be added that the humerus, shown in his figure is nevertheless very slightly

more bowed than that of the type of *Pachycyon*, and in his opinion the Peruvian Dog corresponded closely to a European Turnspit or Dachshund, whence he calls it *Canis ingae vertagus*. The figures of the skull of the same specimen likewise show an apparent similarity in outline and proportions to that of the Arizona mummy.

There seems thus to be no doubt that *Pachycyon robustus* is after all only a breed of dog cultivated by the Indians of the southern parts of North America and of Peru. It is therefore no longer to be thought of as a problematical mammal of the Pleistocene.

Among the dog-bones obtained by the University of California's investigations of the Indian shell-mounds on San Nicolas Island, off the coast of southern California, are two crania nearly identical in measurements with the Marsh Pass specimen that appear to represent this same small, short-nosed dog. They are characterized by their broad brain-cases, spreading zygomata, wide palates, shortened rostra, and small teeth. In profile the dorsal outline of the brain-case is gently rounded, not flat. The shortness of the rostrum does not amount to real deformity however, for the lower jaw closes normally into its place and the premolars are not markedly crowded, though p^3 is turned at an angle of nearly 50° from the axis of the skull to adapt its position to the sudden narrowing of the skull at this point. Premolars 1 and 2 are normal in position, and there is a short diastema between p^1 and the canine. The ossification seems particularly heavy, yet though old, neither skull has developed a sagittal crest except at the interparietal region. In the dried mummy from Marsh Pass, the shortened nose and elevated forehead give a characteristic appearance to the head which is evident in these crania as well. No limb-bones that can be assigned to this dog, have appeared among the Californian collections. In both crania the opening of the posterior nares is narrow, and a transverse line drawn at right angles to the cranial axis at the posterior end of the palate falls *behind* the last molar, indicating deviation from the normal condition.

The following skull-measurements show close agreement. One of the Californian crania ($\frac{1}{16355}$) lacks any trace of the alveoli of m^2 which are partly broken and partly resorbed. The first premolar is wanting also. The proportions of the maxilla are, however, practically the same in both specimens. The Ancon specimen is figured by Nehring (1884b) of natural size and the measurements are taken from this figure. It too lacks the first upper premolar, and in every respect conforms to the appearance of the other crania.

Measurements of the Skull	Peru: Ancon	Ariz.: Marsh Pass	1 16,355 Calif.	1 16,356 Calif.
Greatest length, occiput to median incisor (alveolus)	141	?132	138	138
Greatest length, edge of foramen magnum to median incisor	—	—	123	121
Median incisor to edge of palate	—	—	68	68
“ “ “ orbit (anterior edge)	55	—	54	54
“ “ “ m^2 (alveolus)	72	71.5	69	—
Canine “ m^2 “	59	60	59	—
Premolars $1-3$ (alveoli)	—	22	20	—
Length of premolar 4	16	16	—	17
Molars $1-2$ (alveoli)	16.5	—	16	—
Width of palate outside m^1	—	—	56	56.5
“ “ “ “ p^3	—	39	42	39
Zygomatic width	—	—	87	85
Mastoid width	—	—	54	53
Width of occipital condyles	—	—	30	31
Nasals, length	—	—	—	41

In addition to the limb-measurements given on p. 497, the Arizona mummy gives the following:—total length from tip of nose to tip of tail following curve of back, 705 (*circa*); tail about 195; ulna 120 (*circa*); carpus to end of longest claw 90; ear about 60–70 mm. long including hair; tail 195; femur 106 (*circa*); tibia 116 (*circa*); hind foot 122.

Remarks.—Although this type of dog seems to have been widespread among the aborigines of southern North America and north-eastern South America, it appears to have quite disappeared and is not clearly identifiable in any of the accounts of the early writers. Mr. Guernsey's discovery of a well-preserved mummy in a burial of considerable age in Arizona, has confirmed my previous identification of the Virginia bones of *Pachycyon* with those of Nehring's short-limbed dog-mummy of Ancon. The cranium is characterized by its breadth and stoutness, its shortened snout and high forehead, gently convex dorsal profile of the brain-case, and the small teeth (upper carnassial 16–17 mm.). The Californian crania agree substantially in every detail. Probably this is the same dog that Moore (1907, p. 423) discovered in Indian mounds on Crystal River, west Florida, of which Lucas observed, “the front of cranium of carnivore and jaws,

are from the same animal, the short-faced dog something like a bull-terrier that seems to have been a favorite with the Indians of the southwest”.

PERUVIAN PUG-NOSED DOG.

Plate 12.

1885. *Canis ingae molossoides* Nehring, Sitzb. Gesellsch. naturf. freunde Berlin, p. 5-13.

Characters.— Similar to the Short-nosed Indian Dog but with even shorter facial bones, an undershot lower jaw, broader zygomata and posterior narial passage. The increased shortening of the face causes a slightly more elevated forehead. The color seems to have been yellowish or whitish, marked or clouded with dark brown.

Distribution.— This Dog is known only from the Peruvian Highlands, where its remains have been found with ancient burials of the aborigines at Ancon and Pachacamac.

Skull-Characters.— A comparison of six skulls from Peru (loaned by the U. S. N. M.) with those of the Short-nosed Dog of North America, leaves little doubt that the Peruvian Pug-nosed Dog is derived from the latter, perhaps through some sort of cross-breeding, possibly as an occasional result of a particular cross, or through the dominance of its peculiarities in cross-bred animals. In most respects, the skulls of both are essentially alike, but the shortening of the rostral portion in the present breed is more pronounced, resulting in an undershot lower jaw. Yet the reduction of the maxillaries is not so extreme as to cause very great crowding of the premolars as in our Bull-dogs or the Pekinese Lap-dogs. Thus in two out of six crania, the third premolar is set almost transversely to the long axis of the skull, but in the others it retains about the usual relation. The second premolar, in two cases, is turned inward at more than the usual angle. In only one of the six skulls is the first upper premolar missing, and here on the left side only.

The opening of the posterior nares is very wide in comparison with the common Short-nosed Dog, and the zygomatic arches are broader. In none of the six skulls do the temporal ridges unite to form a median crest except at the occiput along the interparietal bone. On account of the shortening of the facial bones, the forehead is high, with a deep and broad groove medially. A further result of this shortening is the greater upward turn of the palate, best seen when the crania are

on a flat surface. The palate of the Pug-nosed Dog, makes an angle with the table of about 27° against about 15° in the case of the longer-nosed breed. The same rugose surface of the brain-case, the *heaviness of bone* and the *thickened prominences* at each side of the posterior narial openings, characteristic of the Inca Dog, are seen in this breed as well.

No limb-bones have been obtained that can be referred to this dog, but it is likely that they were short and thick like those of the related breed.

The following table gives dimensions of the six skulls in the U. S. N. M. and is interesting for comparison with those of the Short-nosed Indian Dog.

Measurements of the Skulls	U. S. N. M.					
	172,885	172,883	172,886	172,887	172,884	176,307
Occipitorostral length (excluding incisors)	124	—	138	138	142	145
Basal length	104	—	121	125	119	125
Palatal length	60	—	65	67	67.5	66
Orbit to tip of premaxillary	47	—	49	52	53	53
Upper tooth-row	64	—	—	—	—	—
“ “ (alveoli)	60	—	68	61	69	69
Front of canine to back of molar ² (crowns)	—	—	—	—	58	—
Front of canine to back of molar ² (alveoli)	49	53	57	58	57	56.5
Length of premolar ⁴ (crown)	16	16	15.5	16.5	17.5	16.5
“ “ “ (alveolus)	15	15	14.5	15	16	15
“ “ molars ¹⁻² (crowns)	16.5	16.5	15.5	17.5	—	17
“ “ “ (alveoli)	16.5	15.5	14	15.5	17	16.5
Lower tooth-row (alveoli)	—	—	—	—	—	81
Zygomatic width	91	102	109	94	97	102
Breadth of occipital condyles	27	27	30	29	28	31.5

Remarks.—The existence of this breed of aboriginal dogs with shortened face and undershot, bull-dog-like jaw, was first discovered by Reiss and Stübel in the course of their investigation of the necropolis of Ancon, Peru. Nehring (1885) published an account of their discovery and gave the Latin name *Canis ingae molossoides* to the

breed. At first but a single specimen was found among numerous other dog remains, but further search brought a few more to light, and more recently the Yale-National Geographic Society Expedition has recovered several skulls, from Huacho and Pachacamac.

The presence of this pug-nosed dog among the ancient Peruvians is doubly interesting, not only in that this variation should have occurred here, apparently quite independent of similar cases in the Old World, but in that it should have been preserved, whether through accident, or as supposed, through purposeful selection. Such a shortening of the face through the imperfect development of the bones of the rostrum is found occasionally in other domesticated mammals. The short-faced Cheshire Hogs and similar breeds furnish like instances of the selection and preservation of this mutation, which appears to be definitely heritable. Among undomesticated species, the case of a European Fox is recorded by Dönitz (1869) in which the rostrum was shortened abnormally, producing a bull-dog-like appearance, with undershot jaw. The second and third premolars of the upper jaw were opposite the third and fourth respectively of the lower jaw, while the upper canine fitted into a space between the first and second lower premolars. Schmitt (1903) agrees with Studer (1901) that such cases are due to the retention of embryonic conditions but considers them to be a result of domestication. This, however, is not necessarily the case, as the above instance shows. The case of a "bull-dog-headed calf" is recorded by Warren (1910) as having appeared as a "sport" variation.

Notwithstanding the comparatively high cultural development of the Incas, it may be doubted whether they purposely bred these dogs for their peculiarity of face. Quite as likely the anomaly arose, perhaps as a frequent result of cross-breeding between certain of the other canine races, or as a local abnormality, which as a Mendelian character, frequently cropped out in chance crosses. This may be indicated by the apparent rarity of this type of dog in the Ancon burials, and by the considerable variation in slight details of the form of the skull, as if no special type were bred for.

An interesting anomaly of an opposite nature is worth recording in this connection, namely that of a Jackal shot by Dr. J. C. Phillips in Arabia (M. C. Z. 15,872) in which the *under* jaw has failed to reach its normal length and is overshot by the upper jaw. The lower canine closes *behind* the upper instead of anterior to it as in normal cases.

SUMMARY.

Recent careful studies of the teeth indicate that the domestic dog's relationship is with the wolves rather than with the groups of canids represented by coyote, jackal, or fox. The ultimate wolf-like ancestor of the dog is yet to be determined, but present evidence favors the view that it was not one of the large circumboreal wolves, but possibly a distinct and smaller species, from which both large and small breeds of dogs have been derived.

The domestic dogs of the American aborigines were quite as truly typical dogs as those of Asia, and may be assumed to have reached America from that continent, with their human companions. Although it is possible that the larger dogs may interbreed occasionally with wolf or coyote, there is no good reason to suppose that such crossing has had much if any, influence on the original stock.

In a very general way, three types of dogs may be distinguished among the American aborigines: (1) the large, broad-muzzled, Eskimo Dog, with heavy coat and tail curled forward over the hip; (2) a larger and (3) a smaller Indian Dog, from which are probably to be derived several distinct local breeds. Of the larger style of dog as many as eleven varieties may perhaps be distinguished; of the smaller, five.

An interesting and suggestive parallel is found among prehistoric European dogs, of which in late Neolithic and early Bronze periods there were a large and a small type — *Canis intermedius* and *C. palustris* — corresponding rather closely to the Larger or Common Indian Dog and the Small Indian Dog or Techichi. The obvious probability is that these two general types of dogs were then widely cultivated in Asia, and at a very early period reached Europe and America with the human immigrants. In a similar way the Eskimo Dog is of a type common to northern Asia and Europe, and doubtless reached America with the Eskimos, whose arrival, at least in eastern America is usually regarded as relatively recent.

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EXPLANATION OF PLATES.

PLATE 1.

PLATE 1.

Fig. 1.— Eskimo Dog. The grandparents of this dog were brought by Peary from Smith's Sound, Greenland. Photo by Ernest Harold Baynes.

Fig. 2.— The Hare-Indian Dog of northern Mackenzie. From Richardson's plate (1829).



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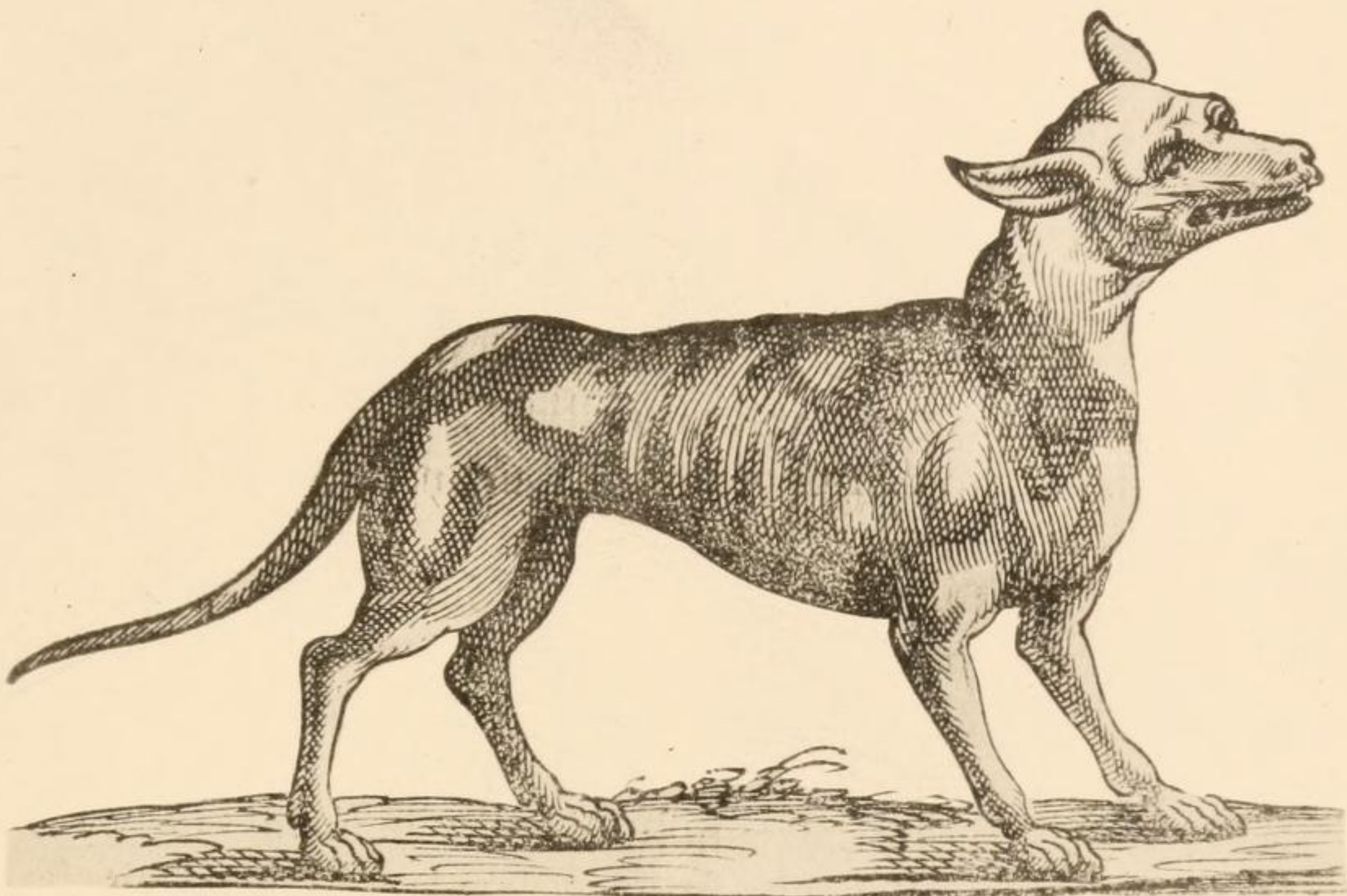
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PLATE 2.

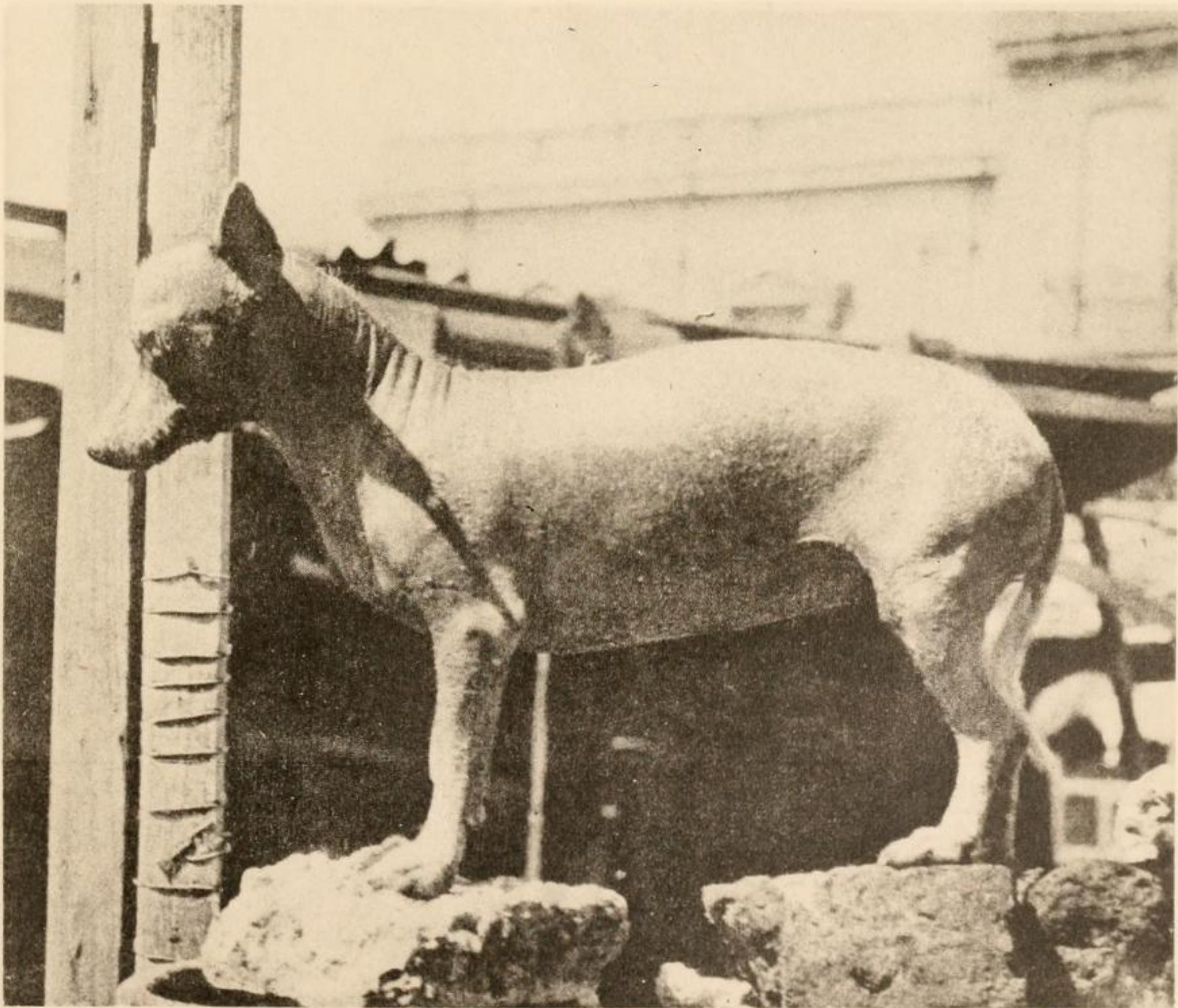
PLATE 2.

Fig. 1.— Mexican Hairless Dog. Reproduction of figure of *Lupus mexicanus* from Recchi and Lynceus (1651).

Fig. 2.— Mexican Hairless Dog, ♀ . Photograph by Arthur Stockdale of Mexico City. Courtesy of The Journal of Heredity.



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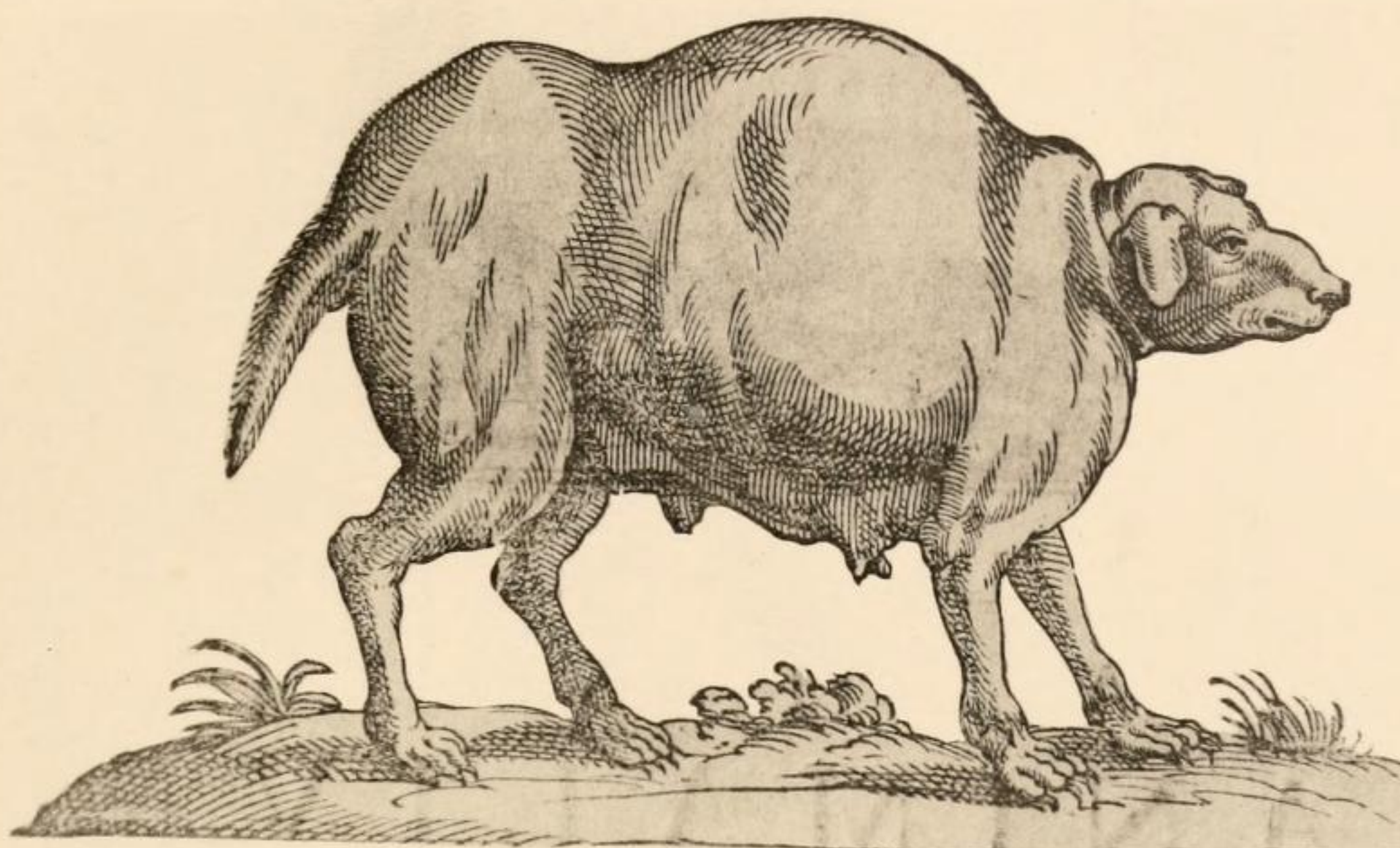


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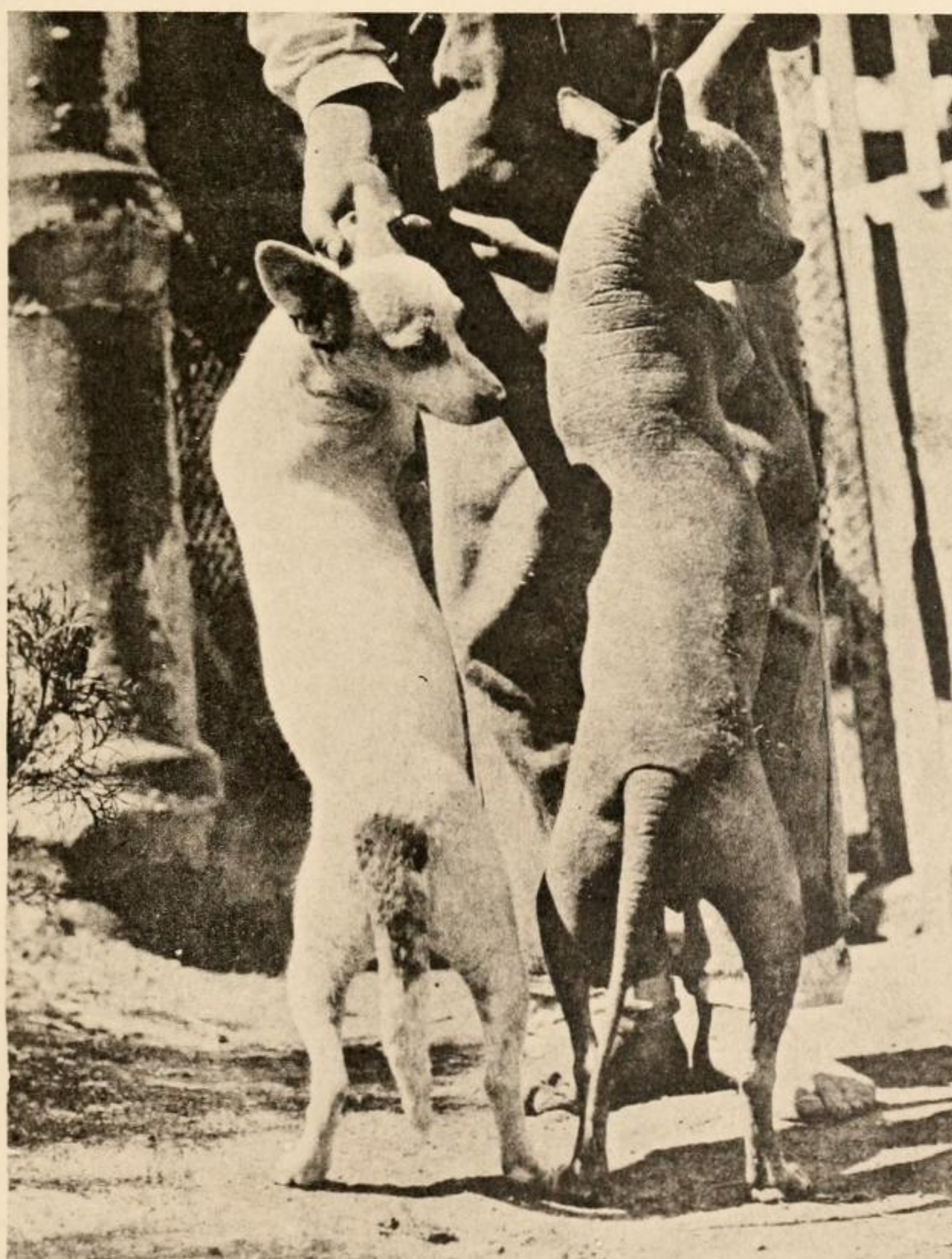
PLATE 3.

PLATE 3.

- Fig. 1.—The Ytzcuinteporzotli or *Canis mexicana* of Hernandez, reproduced from the figure by Recchi and Lynceus (1651) . It probably represents a Raccoon.
- Fig 2.—On the right a Mexican Hairless Dog, on the left a hairy dog from the same litter. The parents of these two were a Mexican Hairless Dog shown in Plate 2, fig. 2, and a mongrel dog, normally haired. Courtesy of the Journal of Heredity.



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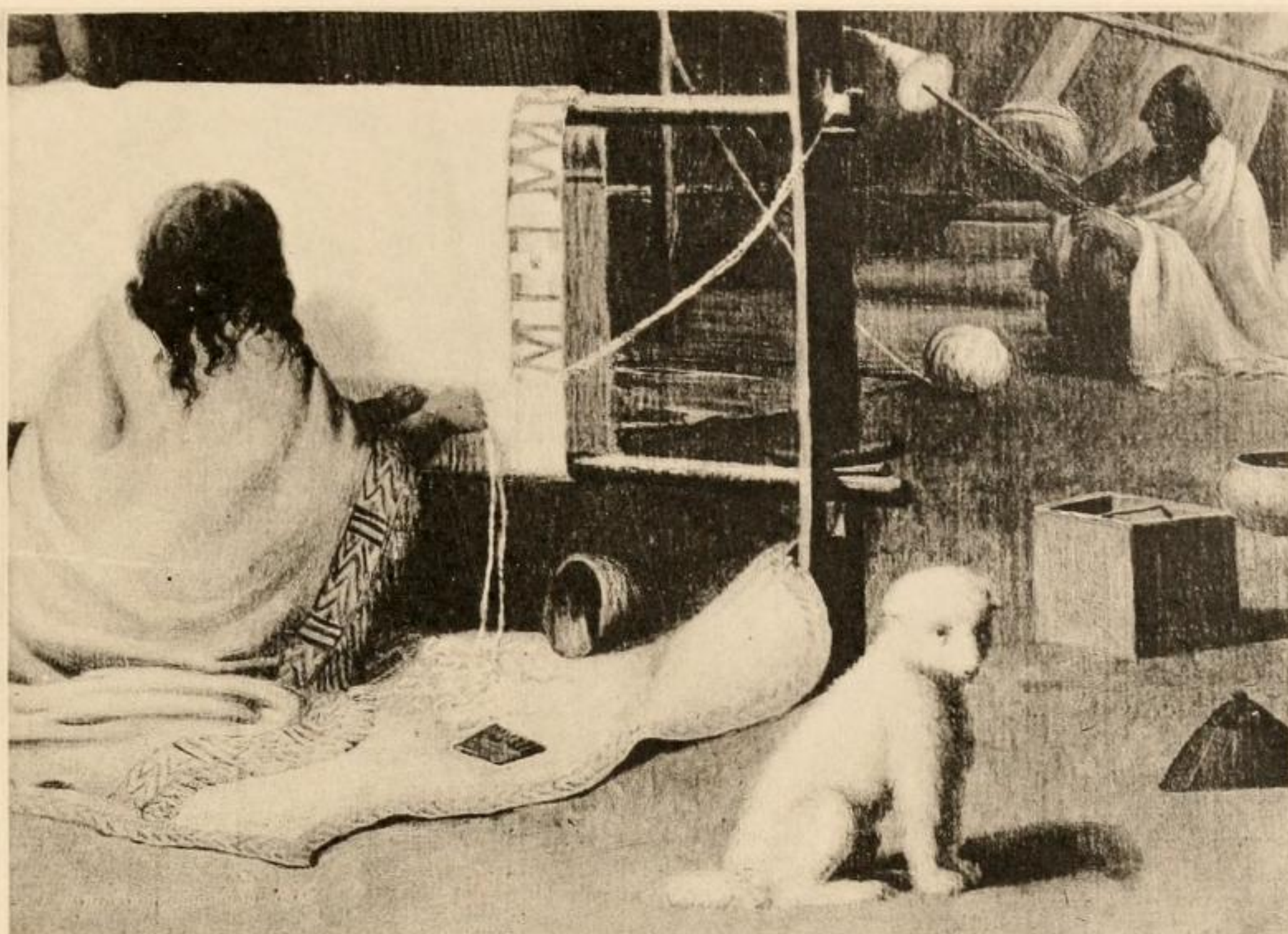
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PLATE 4.

PLATE 4.

Fig. 1.—Clallam-Indian Dog. From the painting by Paul Kane in 1846, now in the Royal Ontario Museum of Archaeology at Toronto.

Fig. 2.—Fuegian Dog. Reproduction of d'Herculais' (1884) figure drawn from a dog brought to France from Tierra del Fuego by the Mission Scientifique du Cap Horn.



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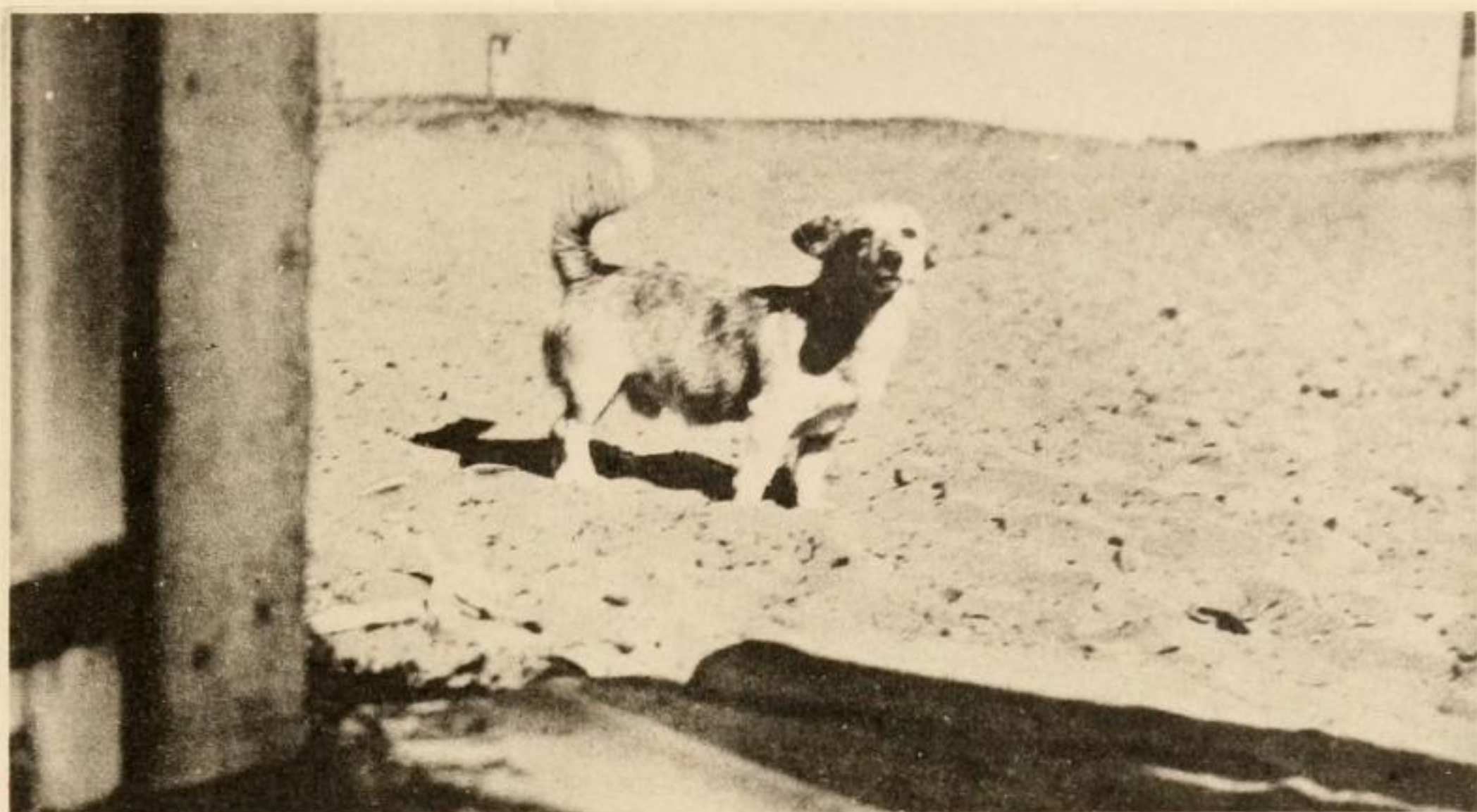
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PLATE 5.

PLATE 5.

Fig. 1.— A dog of the Bersimis Indians, Canada, supposed to represent the Short-legged Indian Dog. Photograph by William B. Cabot.

Fig. 2.— Small yellow-and-white or brindle dogs, with a child of the Macusi Indians in southern British Guiana. These dogs may have more or less blood of European stock, but probably retain some aboriginal characteristics. Photograph by Dr. William C. Farrabee.



1



2

PLATE 6.

PLATE 6.

The Short-nosed Indian Dog ("Pachycyon"). A mummified specimen collected by Messrs. S. J. Guernsey and A. V. Kidder in the Marsh Pass region, Arizona, and now in the Peabody Museum of Archaeology. Photograph by S. J. Guernsey.



PLATE 7.

PLATE 7.

Skull of the Common Indian Dog, collected by Kennicott on Peel River, northern Mackenzie, U. S. N. M. 6,219. Length 177 mm.

Fig. 1.— Cranium in profile showing relatively weak crests and slender muzzle.

Fig. 2.— Lower ramus; the first premolar normally lacking.

Fig. 3.— Cranium, ventral view; upper first premolar lacking.

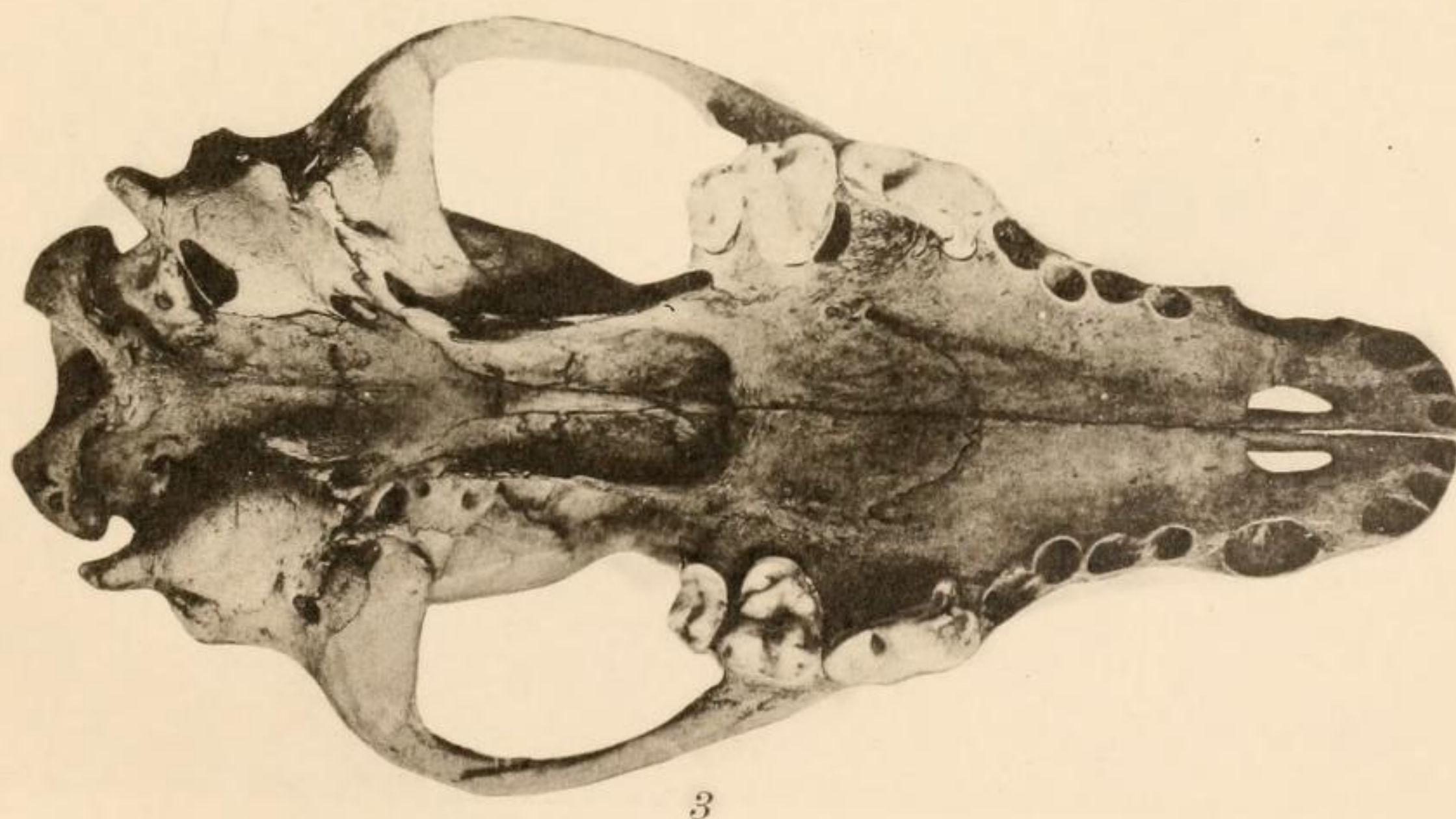


PLATE 8.

Cranium of the Common Indian Dog from Le Moine shell-heap, Frenchman's Bay, Maine, collection of Phillips Academy, Andover, Mass., 53,902 Me. Length 192 mm.

Fig. 1.— Profile view.

Fig. 2.— Ventral view. The first upper premolar is lacking.

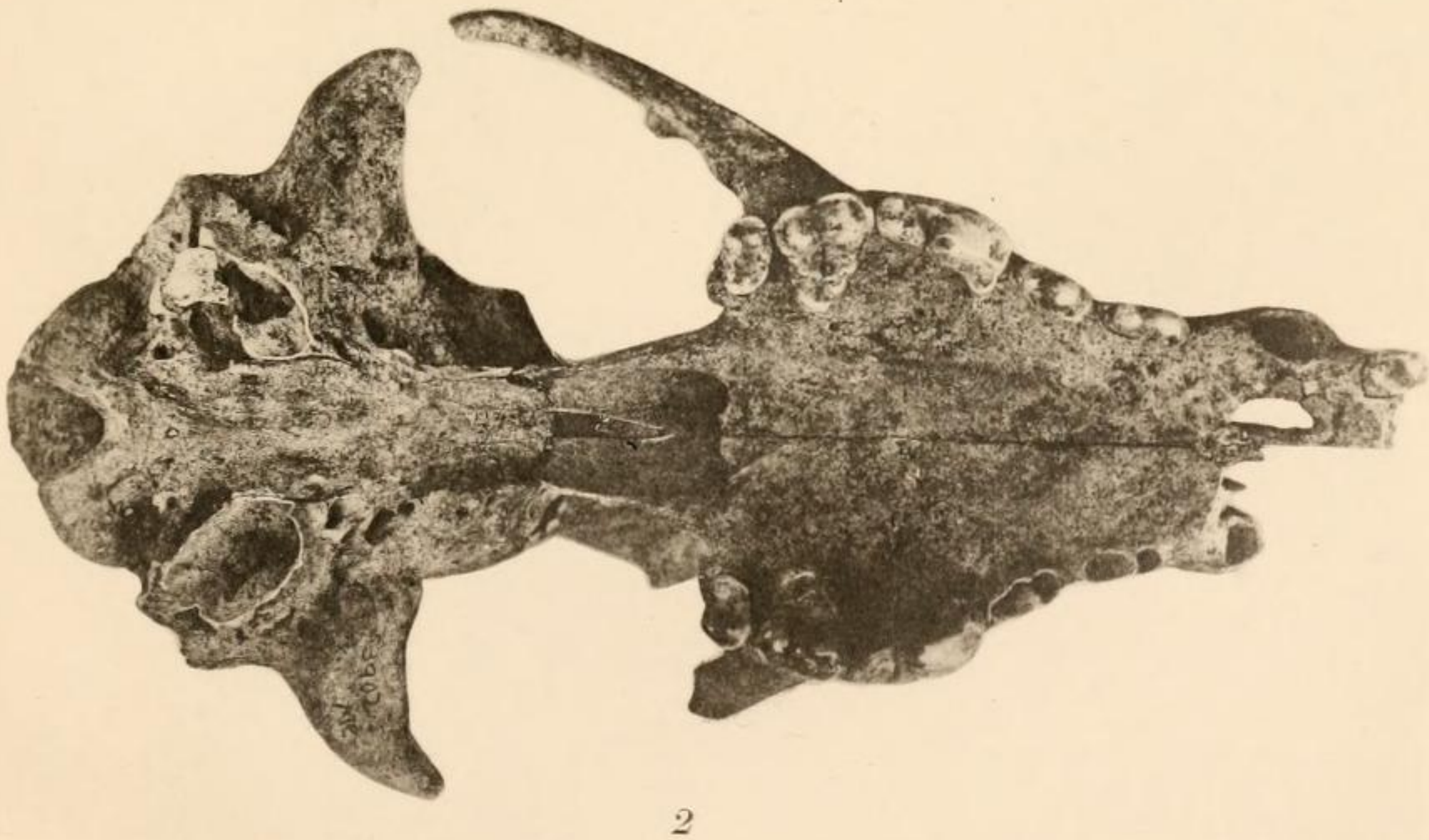


PLATE 9.

PLATE 9.

Cranium of an Inca Dog, collected by Dr. A. Hrdlička at Huacho, Peru,
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Fig. 1.— Profile.

Fig. 2.— Ventral view. The first premolar is present on the left side only.

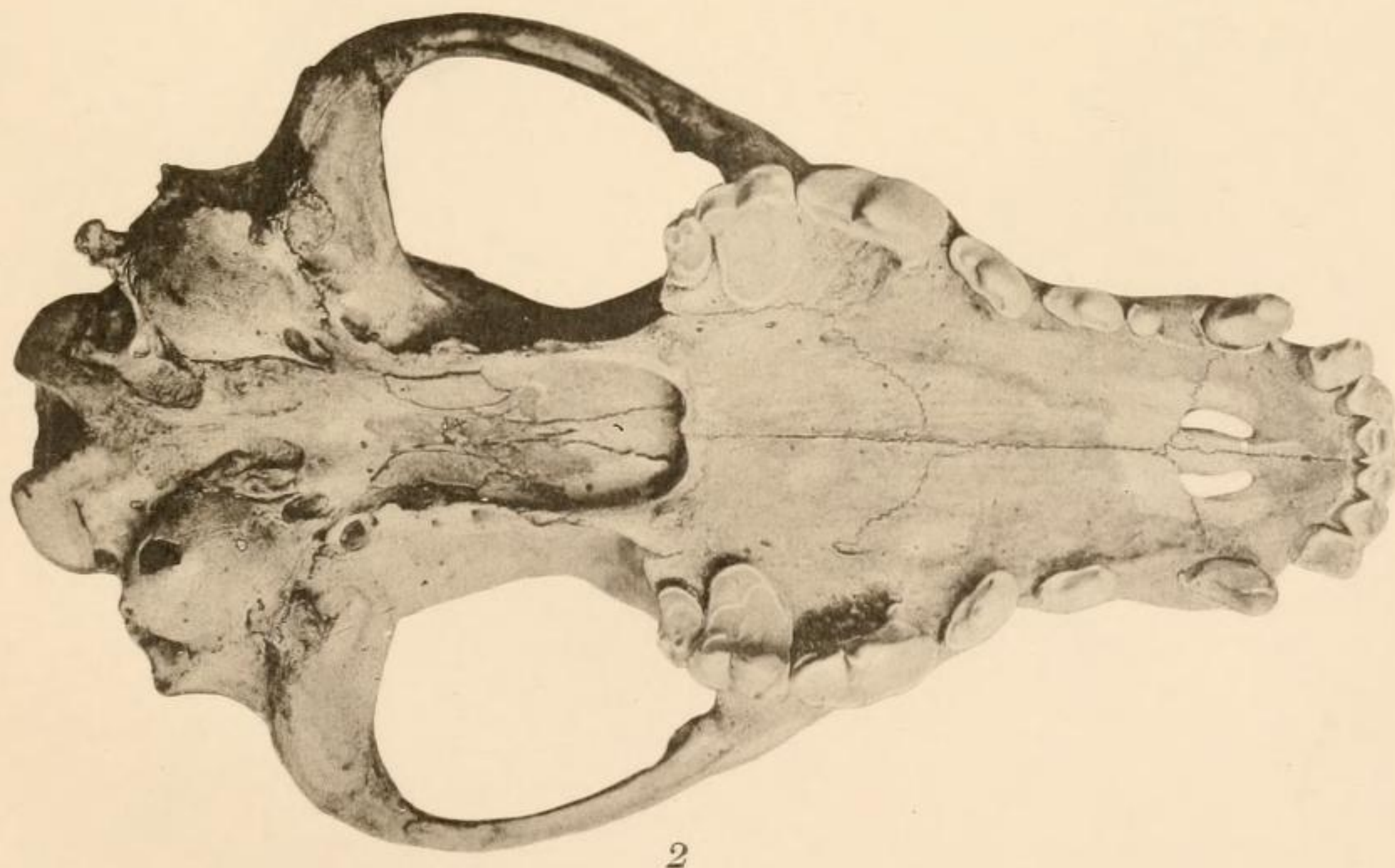
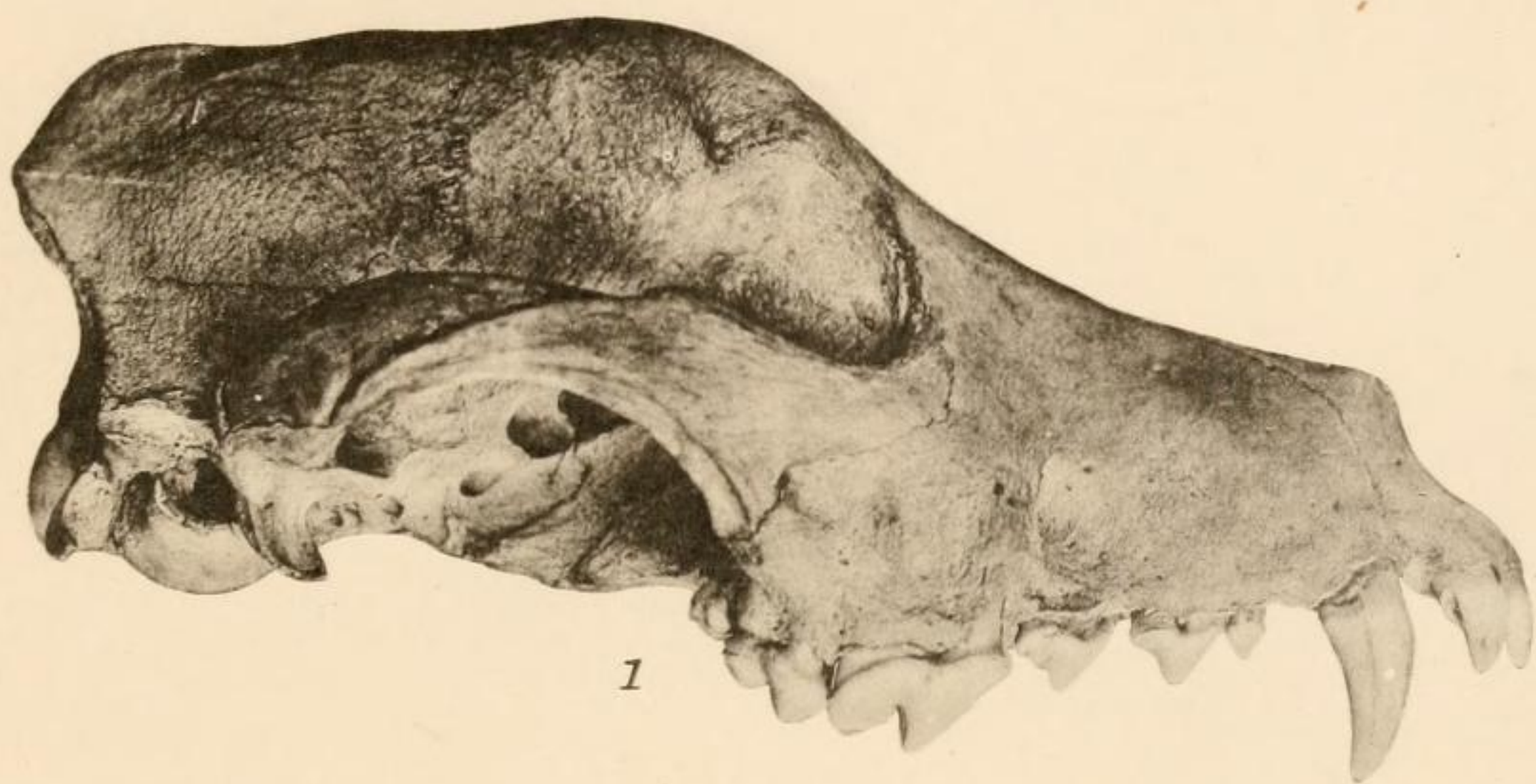


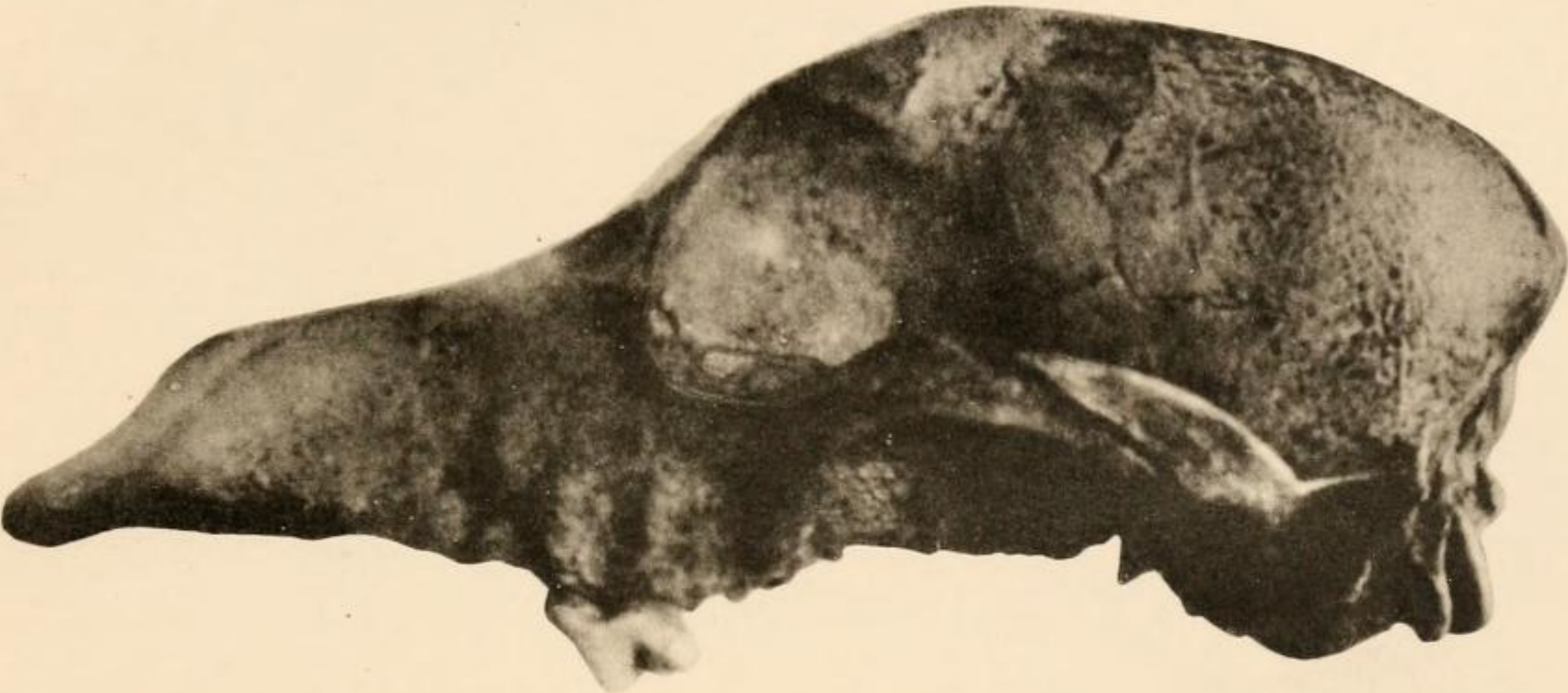
PLATE 10.

PLATE 10.

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Fig. 1.— Profile.

Fig. 2.— Ventral view.



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PLATE 11.

PLATE 11.

Cranium of a Short-nosed Indian Dog ("Pachycyon") from shell-mound on San Nicolas Island, off southern California, Univ. of Cal., Anthropol. Mus., $\frac{1}{16356}$. Length, occiput to tip of premaxillary, 138 mm.

Fig. 1.— Profile.

Fig. 2.— Ventral view.

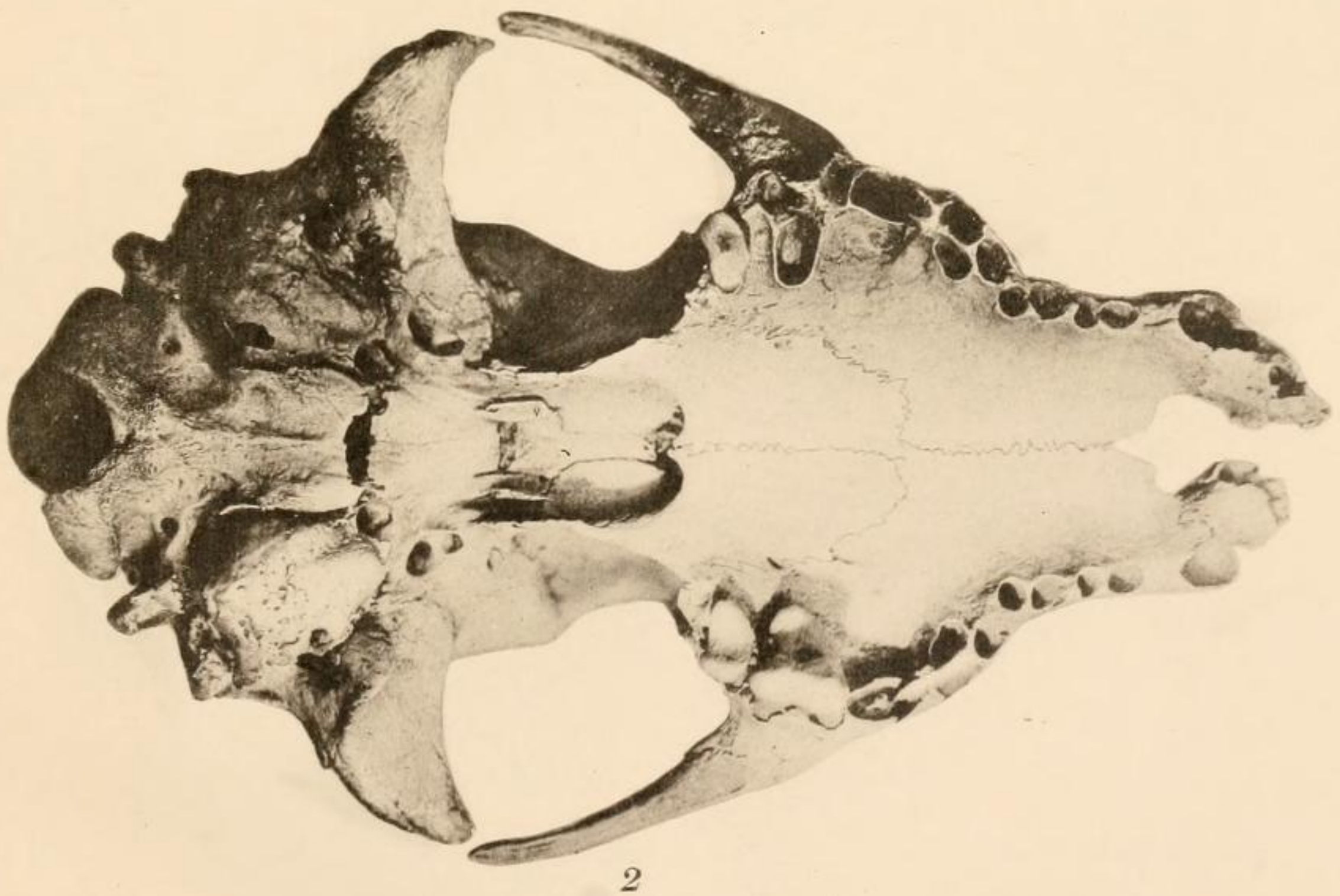


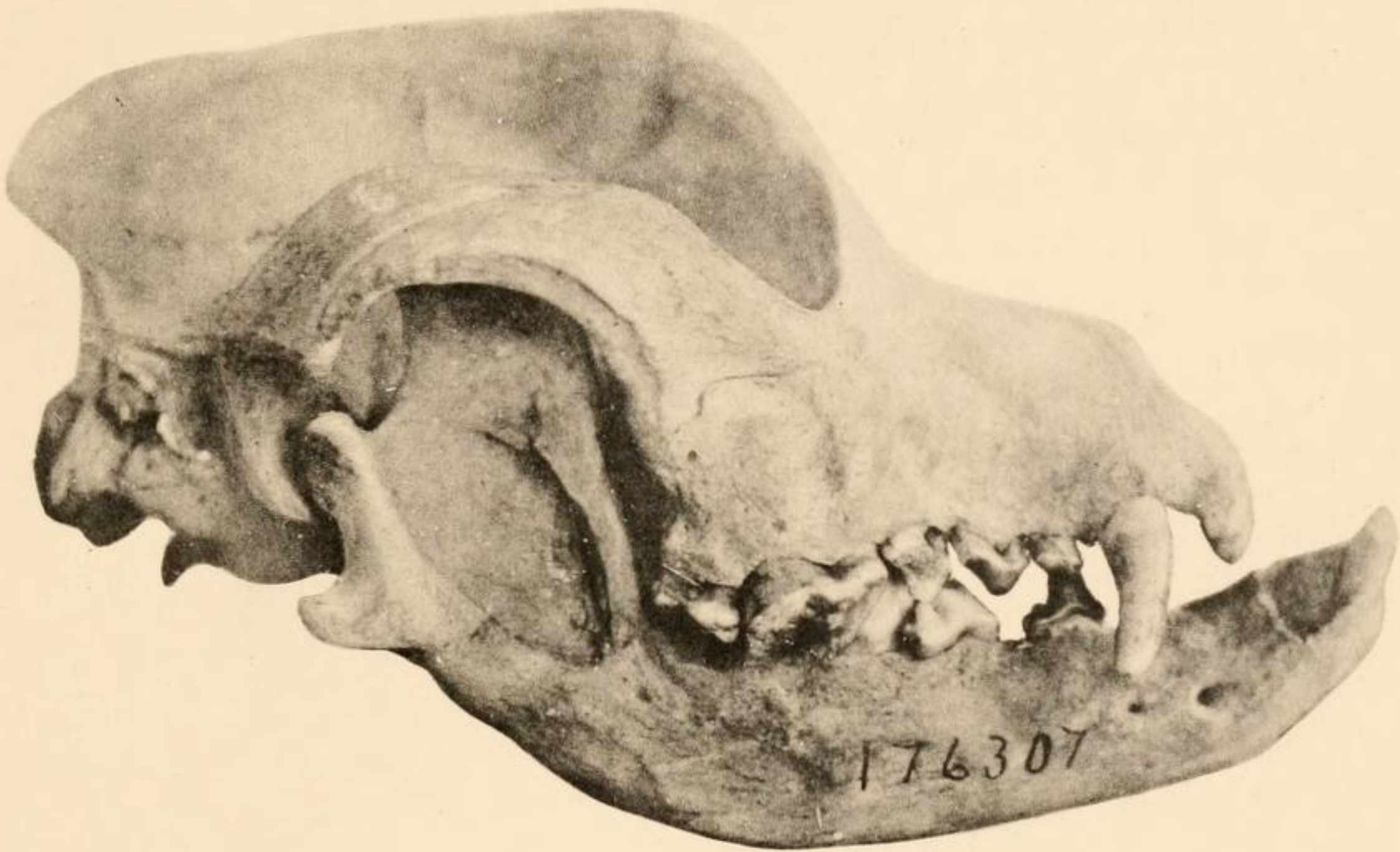
PLATE 12.

PLATE 12.

Skull of the Peruvian Pug-nosed Dog, collected by Dr. A. Hrdlička at Huacho, Peru, U. S. N. M. 176,307. Length of cranium, occiput to tip of premaxillaries, 147 mm.

Fig. 1.— Profile, showing undershot jaw.

Fig. 2.— Cranium, ventral view.



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By Glover M. Allen.

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Introduction.

When Columbus, in 1492, made his discovery of land in the Western Hemisphere, he found it already peopled by a race of men who are

considered by modern ethnologists to be of Asiatic origin, and probably of an antiquity dating back not many thousands of years. Yet these aboriginal peoples were considerably diversified as to appearance, language, and customs. In South America, the Incas had domesticated animals, llamas and alpacas, whose wild progenitors are the last

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remnant of the once diverse phylum of American camels. There is no good evidence, however, that the horse which survived in North America till late Pleistocene times was ever known to the aborigines until its reintroduction by Europeans. Dogs they had, nevertheless, universally and in some variety. Yet at this late date it is hardly possible to define the various breeds or variations with any exactness or to throw much light on the question of their ultimate origin. An attempt is made here to gather what information the earlier travellers recorded as to the appearance of the dogs of the American aborigines, and so far as may be, to characterize the various breeds that can be distinguished.

A bibliography is added giving the more important papers on the origin of the dog, and on prehistoric dogs of the Old World, as well as references to the aboriginal dogs of America.

Acknowledgements.

For the opportunity of studying dog-remains from various parts of the New World, I would express my obligation to the Museum of Comparative Zoology; to Messrs. C. C. Willoughby and S. J. Guernsey of the Peabody Museum; to Mr. G. S. Miller, Jr., of the U. S. National Museum; Prof. F. B. Loomis of Amherst College; Prof. W. K. Moorehead, of Andover Academy; and Messrs. A. L. Kroeber and E. W. Gifford of the Museum of Anthropology' of the University of California.

For interesting photographs of dogs, thanks are gratefully extended to Messrs. Ernest Harold Baynes, W. B. Cabot, C. T. Currelly, W. C. Farrabee, S. J. Guernsey, the Royal Ontario Museum of Archaeology, and the American Genetic Association.

Origin of the Domestic Dog.

The problem of discovering the wild ancestor of the Domestic Dog has engrossed the attention of naturalists from the time of Buffon to the present. Basing their opinion on general external resemblances, the early systematists, Giildenstadt and Pallas, favored the Indian Jackal as the primitive stock whence the European dogs were derived. In this course they have been followed by many later writers, but more exact studies (Miller, 1912) show that the teeth of the Jackal may be

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distinguished by many minor characters (such as the broad continuous outer cingulum on m - and m^2) from those of the Wolf and Dog. Gidley (1913) has illustrated more fully some of the distinguishing tooth-characters of several canids, including fox, wolf, and coyote, and has grouped them into a key, from which it is seen that domestic dogs and wolves are essentially alike in the cusp-characters and proportions of their teeth, and differ from coyotes and foxes in average characters which though slight, are appreciable on direct comparison. Miller (1912, p. 313) concludes that in a series of dog-skulls "representing such different breeds as the pug, fox-terrier, bloodhound, mastiff, ancient Egyptian, ancient Peruvian, Eskimo (Greenland and Alaska) and American Indian, the teeth are strictly of the *Canis* type"; and this assertion I can fully endorse from a study of these and other breeds. Nevertheless, though the Wolf and the Domestic Dog are closely related, it does not follow that the latter is directly derived from the former, though even as lately as 1911, Trouessart has upheld the view first put forth by Jettles (1877), that the Indian Wolf (*Canis pallipes*) might be the ultimate source of certain breeds of the Dog. Studer (1906) suggests some large Dingo-like type as the lost ancestor; while Noack (1907) supposes that the original stock may have been identical with a small Chinese Wolf of which he possessed two specimens from Tschili, regarded as like the Dingo in color. Xehring (1887) suggests that a small Japanese Wolf (*C. japonicus*) is the living ancestor of the Japanese Street-dog. The Dingo itself is of doubtful origin, and though probably a relatively recent arrival in Australia, may have been brought at the time the Continent was first peopled by man. Krefft (1866) believes he has identified its "first molar tooth. . . with other fossil remains in the breccia of the Welling-

ton caves," while McCoy (1862) has "identified its bones mingled with those of recent and extinct animals all in one state of preservation in the bone-caverns recently opened beneath the basalt flows at Mount Macedon." In New Zealand, domestic dog-remains of a different breed are found associated with those of the extinct giant rails in the kitchen-middens And j:)resumably came with the Maoris (Hutton, 1898).

The older naturalists maintained the view that cross fertility was a test of specific identity, and recorded many cases in support of the contention that the Dog was fertile with Wolf and Jackal, and that hence it was of such mixed ancestry. Thus, Hunter (1787) recorded the fertile cross between a male Dog and a female of the Wolf and of the Jackal, whence he concluded that all were of one species. A more

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recent investigator, (Kiihn, 1SS7) records the fertilitv' of Dog-Jackal hybrids when crossed infer .sc or l)ack crossed. In thiscase a female Finnish Bird-dog was bred to a captive Indian Jackal {Canis- aureus iudiruft), producing three litters of four each. All the young were much alike in appearance reseml)ling the Jackal, but were somewhat darker in color. One of the hybrids l)red to a Sil)erian Dog produced seven young. Two other of the original hybrids were paired together, and produced a litter of three young after a period of sixty days' gestation — the normal time for a dog. These young were darker

than their parents, with a wash of golden along the sides and on the head, recalling the Jackal's color. Unfortunately no careful study of the cranial and dental characters in the hybrids was made.

The crossing of Wolf and Dog has been frequently accomplished in captivity (Hunter, 1787, 1789). An instance of the fertile crossing of a Siberian Sledge-dog with a female Dingo from Australia is recorded by Eitfe (1909). The North American Indians and the Eskimo are accredited with tethering female dogs in heat at a distance from camps to obtain crosses with wild wolves, which though usually highly hostile to dogs, will at such times, it is said, hybridize. According to Cones (1873) and others, similar methods were used by the American Indians of the Plains to obtain crosses with wild coyotes. Yet the evidence is not altogether convincing that such cross-breeding was very general, or that it has modified the native dogs in any way. It is noteworthy that the American Indian is not given to the domestication of Wolf or Coyote puppies as might be expected if either were the prototype of his Dogs. Nevertheless Coues (1873) and Packard (1885) on the ground of general external appearance have held that the common Indian Dog of North America was merely a tamed Coyote; and their view has gained wide credence. It may be confidently stated, however, from a study of skulls and teeth, that this is not at all the case. Packard was perhaps influenced by Cope's (1883, p. 242) statement that "many of the domesticated dogs have been derived "from the Wolf and the Coyote, as found in the Pliocene deposits of the Republican River formations. The American Indian dogs, however, are true domestic dogs in skull-characters, and show no evidence of derivation from coyotes.

Crosses between domestic dogs and foxes have been less commonly reported, and even these reports seem to lack proper substantiation in most cases. B. Ross (1861) explicitly states that the dogs of the northern Indians could not be induced to cross with captive foxes. A supposed case is given by Toni (1897) of a natural hybrid, but its ancestry as in one or two other cases, was merely conjectural.

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While some naturalists have thus sought to derive the Domestic Dog from Wolf, Jackal, Coyote, or Fox, or from a mixture of two or three of these, others have maintained that it is quite as well entitled to be considered a distinct species with its various artificial breeds. Buffon was one of the first to support this view. Pictet (1800, 1, p. 203-210) believed that dog remains from cave-deposits in Europe probably represented the wild ancestor of domestic dogs, and to this wild species he gave the name *Canis familiaris fossilis*. In this he was followed by Bourguignat (1870) who regarded the Prehistoric Dog as a species, related to the Wolf but coexistent with it in a wild state. He applied to it the name *Canis ferus*, and concluded from the relative scarcity of its remains in the earlier strata of human culture, that it was at first seldom domesticated by the early cave-men. Remains of Pliocene canids from central France have been suggested by Boule (1889) as representing the progenitors of the Domestic Dog.

Although the recent and more exact studies of Miller (1912, p. 313)

and Gidley (1913, p. 99) have shown that the Domestic Dog may be distinguished by dental characters from Coyote, Jackal, and Fox, its close relationship to the wolves is shown, as they point out, by the shorter and narrower heel of the lower carnassial in proportion to the length and width of the remaining part, the general bluntness and plumpness of the premolar and molar teeth and their cusps, as well as by the shorter and blunter canines. Other less constant but average distinctions are tabulated by the latter author. A noticeable character of the lower tooth-row in Wolf and Dog may also be mentioned, namely, its distinctly outward bend at the junction of the molar and premolar series, whereas in the Coyote and the Jackal, the axis of the tooth-row is much more nearly a straight line. The presence of a minute second posterior cusp in addition to the cingulum in the fourth lower premolar is characteristic of Jackal and Coyote.

The relationship of the Domestic Dog having thus been found to be wholly with the Wolf, and not with Jackal, or Coyote, it remains for future investigation to show what wolf-like ancestor was its wild progenitor. This, however, lies outside the scope of the present paper. Yet it may be said that no evidence has hitherto been adduced that clearly indicates the origin of the Dog from any of the large wolves of circumboreal distribution. In general the skull of the Dog is at once distinguished from that of the Wolf, apart from its usually smaller size, by the higher forehead of the former. That this, however, is due to greater development of the cerebrum through domestication has been suggested by Hammeran (1890), notwith-

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standing that domestication in case of most animals seems rather to have a stultifying effect. A more diagnostic character is found in the size of the teeth, Avhich e^•en in the largest breeds of dogs are considerably smaller than in the wolves. A fact of probable significance is that in wolves as in the less modified breeds of dogs, e. g., the American Indian dogs, the free posterior border of the palate ends about on a line passing transversely through the middle of the last molar. In the large breeds of European dogs a transverse line at the hinder margin of the palate usually falls considerably behind the last molar, indicating probably that the teeth have retained more nearly their original size relations than have the maxillar,^' and other bones. A like condition is seen also in dogs in which the teeth are abnormally reduced in size, due probably, as in case of the Chinese Chow Dog, to a diet of soft foods as rice and fish through many generations. These facts tend to indicate that the Dog and the large Wolf are really distinct species, and that the wild progenitor of the Dog was a small Wolf of a species distinct from the large wolves of circumboreal distribution. It is natural to look to Asia for this unknown ancestor, and it would be valuable if the studies of Noack and Nehring as to the small wolves of Tchili and Japan might be more fully confirmed. Jentink (1S97) suggests the Wild Dog of Java as a representative of the original stock whence the Domestic Dog sprang.

Attention should here be called to the possible effect of domestication in reducing the size and proportions of the Wolf. Apparently

the only investigator to compare the skulls of wolves born in captivity with those of wild individuals is Wolfgramm (1894), who states that the skulls of the captive-born wolves are smaller in all proportions, broader and higher, with less developed muscle-crests. The snout is so shortened that the pm^1 is forced to assume a transverse position, the lower premolars are imbricate, while in size the carnassial as well as the other teeth are said to be slightly reduced. Wolfgramm concludes that this is sufficient proof that the Dog is derived from the European Wolf, and that its smaller size is a direct result of its domestication. The facts, however, do not warrant such a conclusion. The reduced size of the skull and the crowding of the teeth in captive-born wolves are probably a result of improper nutrition during growth and lack of exercise under confinement, conditions wholly different from the free life of a dog under domestication. The crowding of the premolars is quite as abnormal for a dog as for a wolf, and occurs through failure of the maxillary bones to attain their proper growth, while the teeth themselves attain their size independently.

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While some authors have considered that modern dogs are polyphyletic, and would trace the ancestry of the larger breeds to wolves and of the smaller to foxes (Woldrich, 1886a, even suggests the Fennec!), it seems more reasonable to derive them all from a medium-sized dog through selective breeding. Nevertheless it is possible to divide modern breeds into some four to six groups, based mainly on

size and minor external characters as erect or lop-ears, drooping or curled-up tail, etc. Cuvier (1808) believed that the French Sheep-dog approached the wild prototype most nearly of all domestic breeds, and considered the Australian Dingo as the most primitive true dog. The characters considered primitive are chiefly the medium size, the erect, wolf-like ears, imshortened snout, drooping and moderately haired tail, and low forehead. The ability to bark is often considered an acquired trait; and the more primitive dogs, such as the Eskimo, howl like wolves more than they bark.

Historic evidence as to the ancestry of the Dog does not carry the matter far enough. The Egyptians had dogs as far back as the records go — certainly four to five thousand years before the Christian era. The same is apparently true of the Chinese, Avhose history goes back nearly as far. Lertet and Gaillard (1909) recognize four breeds of dogs among the mummified remains from Assiout. Fitzinger (1866) has summarized the ancient history of dogs known from the earliest writings of Rome, (ireece, Assyria, and Egypt. Yet it is clear that at the dawn of history, the nations of Europe, Asia, and North Africa had dogs of several breeds, more or less characteristic of each people. Thus the Greyhound type seems especially prevalent in Egypt and is to this day associated with the desert-loving races of Persia and northern Africa.

European archaeologists have made many disco\eries of dog-re-mains in association with bones and implements of prehistoric man, particularly in the caves and old Lake-dwellings of southern P^urope. Hitherto at least eleven different Latin names have been applied to

as many supposedly distinct prehistoric dogs of Europe. Anutschin (1881) announced the discovery of the first dog-remains to be found in Russia. Parts of fourteen dog-skeletons were found in building the Ladoga Canal, and represent two types which he names respectively *Canis familiaris palustris ladogensis*, and *C. f. inostranzewii*. He considers these to be of the Stone Age, and that the former is closely allied to the Siberian and Northwest American Sledge-dogs — (Eskimo). The latter he thinks very similar to the *C. familiaris optecensis*, a deer-hound-like type, from the Bronze Age, or even earlier (Neolithic,

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according to Xehring, 1883). Dog-remains, associated with a human skeleton and palaeolithic implements, were described by Studer (1906) as *Canis pmdiatini*, and were discovered while digging a street near Gute Bolognè in Russia. This was as large as a medium-sized Sheep-dog and is believed by this author to be the fore-runner of the *Canis* of the Bronze Age, which is possibly a hound.

In the Swiss Lake-dwellings occur skulls of a smaller type of dog named by Riitimeyer *Canis palustris*, a breed characteristic of the later Neolithic and the Bronze Ages, in Europe, 6,000 to 7,000 years ago. Another Neolithic Dog of small size (skull length, 180 mm.) is described by Hue (1900) from Val de Jura, as *Canis italicus*, while still another of dwarf proportions, *f. miniatus*, is considered by Studer (1906) as a fore-runner of *C. familiaris*. The same author (Studer,

1901) sees much resemblance between skulls of *C. pcdustris* and those of Chow and Spitz. undoubtedly the Chow is a rather ancient type, in many ways recalling the Eskimo Dog in its erect short ears, broad muzzle, small eyes, bushy mane, and curled-up tail carried stiffly over the hip. Measurements of skulls of Chows given by Stüfeler are slightly larger than those of *C. palustris*.

No less than four breeds of dogs are recognized by Stübel (1898) in human culture layers transitional from the Neolithic to the Bronze Age in Emilia, Italy. One is the small *C. palustris* wide-spread in the Stone Age of Europe; the second is *C. hircynicus*, a larger dog supposed to be a hound; the third is the larger *C. familiaris*, regarded by Studer (1901) as of the Collie and Sheep-dog (Wolf-dog) type, while the fourth is a Dog smaller than *palustris*, and believed to be of a distinct breed which Stübel names *C. spaldti*. Remains of the first three of these breeds are recognized by Woldrich (1898) from culture layers of middle Neolithic times in caverns of Bohemia.

From these brief accounts of discoveries of prehistoric dogs it is clear that at a very early period of human culture there were at least two or three types under domestication in Europe. It need not be supposed, as some authors have done, that these types are of local origin. Europe, as a peninsula of Asia, probably received its dogs as well as its human population in part at least from the East. Possibly then, as now, certain breeds of dogs were characteristic of different invading tribes.

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Origin of American Dogs.

Very little attention has been paid to the dogs of the American Aborigines. At the present day it is probably too late to find pure-bred examples of most of the local varieties that formerly occurred. Barton (1805) was about the only American naturalist to give much thought to the matter, but the few notes he collected were taken mostly at second-hand and were rather indefinite. Coues, Cope, and Packard, as well as many writers following them, considered that the domestic dogs of America must have been derived from the Coyote, or from some other indigenous species of North or South America. Cope was the only one who made an examination of the teeth. In a fragment of a lower jaw from Florida, Cope (1893) made particular note of the absence of the first premolar and remarked on the large size of the metaconial and the entoconid of the lower carnassial. It is true that in a large percentage of American native dogs the first premolar is absent from the lower jaw. A similar anomaly is occasionally seen in wolves and in European dogs, but is rare. It is usually considered that the first premolar in dogs is without a milk predecessor, but though this is often true, it is not always the case. A jaw of a very young dog in the ^Museum collection, shows very small milk-teeth capping the permanent first premolars which are nearly erupted. A similar case is reported by Lataste (1888). The entire suppression of the first premolar, particularly in the lower jaw, in a large percentage of American dogs, is possibly a retention of the

usual early condition, in which there is no first milk premolar.

The important paper of Loomis and Young (1912) and the reports of Nehring on dogs from ancient Peruvian burials comprise most of the work that has been done in the comparative dental and osteological study of American dogs. There are, however, brief notices of the discovery of prehistoric dog-remains and early accounts of certain native dogs by travellers, the more important of which are included in the Bibliography (p. 504-017). Miller (1912) seems to have been the first to show that the teeth of American aboriginal dogs are those of true dogs rather than of coyotes or wolves. This I have verified from a considerable mass of material from North America and Peru, so that there can be no question but that the domestic dogs of both Old and New Worlds are closely related and of common ancestry. It follows that instead of having domesticated various dog- or fox-like species of the American continents, the peoples of the New World

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must have brought their dogs with them, presumably from Asia, and this probably at a culture stage prior to the domestication of other animals, at least in the North, since no other domestic animal is common to the peoples of both hemispheres. The Asiatic origin of American dogs has previously been suggested by Mercer (1897, p. 126) and Wissler (1917).

The probability therefore is, that the Domestic Dog originated in Asia and was carried by primitive man both east and west into all parts of the inhabited world. That this migration began in late Pleistocene times seems highly probable.

In the Western Hemisphere three types of dogs may in a very general way be distinguished : — (1) the large wolf-like Eskimo Dog of the Arctic countries, strong, powerfully built, with broad muzzle, erect ears, and large bushy tail curled forward over the hip; (2) a smaller type, varying more or less in size and proportions, with erect ears but a drooping tail; and (3) a much smaller type, the size of a terrier, heavy of bone, usually with shortened rostrum as seen among the tribes of the Southwest or again, apparently more slender both in limb and skull as in southern Mexico or parts of South America.

South of the Eskimo country, the two latter types of dogs are characteristic, and seem to have occurred together over much of their range, so that travellers often mentioned a "wolf-like" and a "fox-like " dog among the Indians of both North and South America.

In this connection, it is interesting to recall Kohler's (1896) statement that in eastern Asia, between the provinces of Gansing and Ussuri, the Chinese have small fox-like dogs, a comparison of which with the small American dogs would be of interest. The smaller American dogs of the slender type (Techichi) seem not very different from the Old "World *C. palustris*, and may be not remotely related. The more heavily built small dogs with shortened faces and shorter, stouter limb-bones, are perhaps derived from the more slender type, and possibly owe certain of their peculiarities to cross-breeding with the larger dogs, though this is at present wholly conjectural.

Breeds of American Aboriginal Dogs.

While in a very general way it may be said, that excluding the Eskimo Dog, the American Indians had domestic dogs of two chief types, a larger and a smaller, there were apparently sundry local breeds of these, probably conforming in distribution with the general areas

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occupied by the groups of tribes amongst which they were found. In the following pages an attempt is made to define such of these breeds as seem to be indicated by the fragmentary accounts of travellers as well as by the study of what skeletal remains have been available. No doubt the number of breeds recognized is subject to revision, for it has been found difficult to determine with any approach to certainty in some cases, what external and skeletal characters are to be associated, and in how far certain supposed breeds are mongrel or relatively pure. Again, the skeletal characters may frequently fail to give any clue to external traits that would be distinctive. Moreover, while the term "breed" is applied to these locally distinct forms of dogs, it is not assumed that the American natives made any conscious effort to change or keep constant the traits of their dogs; possibly some of the variations are merely the result of a certain mongrel mating, going on quite independent of human intent, so that, as in case of the Peruvian Pug-nosed Dog, the variation cropped out only occasionally and may or may not have been purposely preserved.

Nomenclature. — The bestowal of Latin names upon the different breeds of dogs recognized has here been purposely avoided, as it seems unwise to extend to such artificial variations the systematic recognition accorded natural species and subspecies. Nevertheless, Latin names or Greek letters have been used by other writers to indicate domestic breeds, and such names have been applied in many ways : — as trinomials, quadrimomials, or quinquenomials ; sometimes separated from the binomial, *Canis familiaris*, by a comma or the abbreviation "var.," or otherwise used in such a way as to cause doubt as to their technical standing in systematic nomenclature.

Some names of dogs have been erected in a strictly binomial fashion and if accorded standing, conflict with other names. Thus Riitmeyer's *Canis ijalustris* (1863) of the Lake-dwellings is preoccupied by von Meyer's *Canis (= Ggolecynus) palustris* (1843). The name *Canis mexicanus* currently used for the Mexican Wolf proves to apply to the Mexican Hairless Dog only. Hodgson's *Canis laniger* (1845) for a Tibetan Wolf is preoccupied by Hamilton Smith's *Canis laniger* (1840) for the Nootka Sound Dog. Other cases might be added.

The practice of using standard English (or vulgar) names for all artificial breeds is therefore to be recommended. With the descriptions following, a list of Latin names applied by previous writers is given under each breed.

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EsKLMo Dog.

Plate 1, fig. 1.

1817. *Canis familiaris tihiricus groenlandicus* Walther, Hund, p. 27 (fide Fitzinger; not *Canis groenlandicus* Bechstein, 1799, q. e. *Alopex*).

1820. *C. f. var. n. borealis* Desmarest, Mamm., 1, p. 194.

1840. *Canis borealis* Hamilton Smith, Jardine's Nat. library. Mammalia, 10, p. 127, pi. 2.

Characters. — Size large, appearance wolf-like, but with less oblique eyes, less attenuated muzzle, and more elevated forehead; tail usually carried curled forward over the hip: teeth much smaller than those of the Wolf. Pelage thick, with a shorter under fur overlaid with longer hair which on the shoulders may be as much as eight inches long; tail bushy. Color whitish, more or less clouded on the back, with dusky, or varying to black, or black and white, or rarely tan and white.

Distribution. — The Eskimo Dog was originally found in Arctic America coextensively with the Eskimo tribes from the barrens of Alaska to Labrador, chiefly along the coast. In the east it was probably at its southern limit on the east coast of Newfoundland, and thence ranged northward, accompanying its Eskimo masters, to Smith Sound, Greenland. In Greenland it formerly was found along the west coast southward, with the natives, but the present-day sledgedogs of the Danish settlements are probably largely mongrel, through interbreeding with dogs introduced from Europe (Brown, 1875); and the same is true of those in Alaska and southern Labrador.

External Measurements. — An Eskimo Dog brought back by Parry, on his first voyage, is figured by Children (1827) who gives its dimensions as follows : —

Length, occiput to root of tail 28 inches about 71 cm.

" " end of nose 11 " " 28 "

of tail (about) 18 " " 45.7 "

Total length (therefore about) 57 " " 145

Length of ear 3 " " 7.7

Eyes to point of nose 4 " " 10

Standing height at shoulder 24 " " 61

- These figures do not indicate a very large animal. The very thick coat, especially on the shoulders, gives an increased appearance of size not well borne out by skeletal measurements. It should be kept in mind, that since the advent of Europeans, much attention has been

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view to increasing the size and strength of these northern dogs for draught purposes. It is likely that the large wolf-like Eskimo Dogs now common in the North, are considerably different from the original stock found by the early Arctic explorers.

Figures. Children, J. G. Zool. journ., 1827, 3, pl. 1. From Parry's first voyage.

Audubon, J. T. and Bachman, J. T. Quadrupeds of North America, 1848, 3, pl.

113. Zoological Gardens, London.

Smith, C. Hamilton. Jardine's Nat. Library Mammalia, 184(), 10, pl. 2.

Prince's Street Gardens, Edinburgh.

Cranial Character¹. — Among the various skulls of so-called Eskimo Dogs examined, there is more or less disparity of size. This is no doubt an indication of the extensive crossing with European dogs that has been carried on for a long period with a view to improving the speed and strength for which this dog is useful. Skulls from eastern Kamtschatka are small, others from Alaska and Mackenzie are of superior size. It is therefore difficult at the outset to determine what the original Eskimo Dog of North America was really like. It is notable, however, that the teeth, even of the largest skulls are not much larger than those of medium-sized skulls, while in no case do they approach the magnitude of the Wolf's teeth. It would be of the utmost interest, in this connection, to compare the teeth of a known hybrid between the Eskimo Dog and a Wolf. Yet in spite of the fluency with which this cross is said to occur, there seem to be few

skulls available. Windle and Huxthreys (1900, p. 9) give the ratios of different parts of such a skull to the basicranial axis.

For lack of a more authentic standard, I have taken as typical of the P'skimo Dog, portions of a skull (M. Z. 10, 537-10,539) examined by Dr. M. P. Porsild from an old village site at Sermermiut, west Greenland. While not of great size, this skull is notable for its broad palate, rather prominent trough-like depression between the frontals, and the high strong sagittal crest, yet is the surface of the brain-case comparatively smooth. Nearly similar is the skull of an Eskimo Dog from Hebron, Labrador, collected in 1897. Its wide palate and stout teeth are particularly noticeable as well as its strongly developed crests and broad forehead.

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Nathusius (1874) reports on ten skulls found near old Eskimo huts in Jackson and Sabine Islands, Greenland. The largest of these had a basal length of 189 mm., the smallest 175 mm. In skull U. S. N. M., 83,869 the basal length is 170 mm., the condylobasal length 180 mm., which may be the same dimension as the "basal length" of Nathusius.

In a series of nine skulls of Eskimo Dogs from Greenland, Baffin Land, Labrador, Mackenzie, Alaska, eastern Siberia and Kamt-

schatka, collected for the most part many years ago, it is notable that most are of about the same size as those of the Common Indian Dog. One or two from eastern Siberia are the smallest and most slender. All are heavy of bone, yet the sagittal crest does not show the strong backward overhang seen in the Wolf's skull. The muzzle in most is broad, yet this varies. The largest skull of all (U. S. N. M. 8,222) collected by Dr. W. H. Dall at Nulato, Alaska, is nearly as long as a small Wolf's, yet the teeth do not approach those of a Wolf in size. This and other large skulls of Eskimo Dogs, probably are the result of crossing with large dogs of European origin. Hearne (1796) speaks

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of the large English dogs at the Fort on Hudson Bay; Ross (1861) notes the crossing of Eskimo Dogs with imported Pointers; and Harmon (1820) records that by the early part of the last century, large dogs imported from the English settlements of Newfoundland, had already been introduced in the fur countries as far west as the Rocky Mountains. It seems apparent that the large size of some present-day Eskimo Dogs is therefore due to the influence of imported stock, and that probably the aboriginal Eskimo Dog was not a much larger animal than the Common Indian Dog. The thick coat, however, often adds much to its apparent size.

It seems to be somewhat characteristic of the Eskimo Dog that the posterior nasal opening (interpterygoid fossa) is broader and shallower,

less contracted at its rearmost portion, than in dogs of other breeds, possibly correlated with their use in hauling and consequent need for deeper breathing. In this respect, however, there is some variation; but in certain larger skulls which are presumably of mongrel dogs, the more narrowed and deepened fossa is obvious.

Thorndike (1911), in an interesting article on the Indian sled-dogs of North America, doubts if pure-blooded Eskimo or "Husky" Dogs are today found in North America except possibly about the Coppermine River, Banks Land and Wollaston Land. "In general, the Eskimo Dog differs from the Indian variety in being more wolfish and in having less European strain. His tail is more bushy and he is cleaner-legged. His ears are more erect and pointed, while his body is larger in size" — this in comparison with the mongrel dogs of the northern forest Indians of the present day.

Origin. — From its evident similarity of appearance to the Siberian Sledge-Dog, it is generally accepted that the two are of similar origin. The Siberian Dog seems indeed to differ in little except possibly its slightly smaller size. Dogs of the same type are found across northern Asia into Lapland, whence certain authors have concluded that the Eskimo Dog was undoubtedly brought from the Old World by the Eskimo themselves, who must already have known how to use them in harness. This view seems on the whole very probable. The ultimate derivation of the Eskimo Dog and the so-called Spitz Dogs in general, is however, still obscure. Some form of Wolf is commonly looked to as the remote ancestor of the breed though direct proof is not available. Holland (1908, p. 232) has even gone so far as to

suggest that certain well-preserved jaws discovered in a Pleistocene cave-deposit at Frankstown, Pennsylvania, may from their resemblance to those of an Eskimo Dog, have come from a wolf-like ancestor

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of this breed. The associated fauna, however, is of a more southern character than would be expected as companions of this Arctic dog.

Of the larger dogs of the New World, the Eskimo Dog is the only one that habitually carries its tail curled forward over the hip. This character, striking as it is, does not seem to have been particularly studied from the standpoint of heritability, to see if it behaves as a Mendelian character when contrasted with a drooping tail. Yet it is a highly important trait, and is found not only among the dogs of similar appearance in the north of Asia and Europe, but in other varieties, possibly related, and of more southern habitat in those continents.

The so-called Chow Dog of China, a medium-sized red, or sometimes black (Kreyenberg, 1910) dog, with erect ears and powerful shoulders has the same sort of tail. A similar, though slightly smaller dog standing 50 cm. high at the shoulder is found among the Battaks of Sumatra (Studer, 1901, p. 31). The same curled tail is found in the Pomeranian Dogs, that appear in the decoration of Greek vases (Keller, 1909) or as figurines of Mycenaean times. The fact that the curled tail carried over the hip is so widely characteristic of certain breeds of Old World dogs, where it seems to have been known from ancient times, implies

that it originated there and strengthens the view that the Eskimo Dog came from Asia with the Eskimo. The contention that " the canine of the American aborigine, or Amerind, was simply a tame wolf, differing from its wild brother in the qualities that would naturally follow breeding in the semi-domestication of the savage" and that the dog "bred by the Indians in the forest regions, and the Eskimos, was always derived from the Gray wolf" (Thorndike, 1911), seems only remotely true. There is much evidence, though of a somewhat uncertain character, that wild male Wolves will breed with female Eskimo Dogs at proper seasons, and the northern Indians are said to encourage such occasional crosses. Thorndike states that tame wolves are sometimes seen in harness with the dogs in the North. Nevertheless, under usual circumstances, those who have lived in Arctic countries agree that wolves are highly unfriendly with the dogs, and a single wolf is more than a match for several dogs. There seems to be no evidence that Wolf cubs were habitually reared by either Eskimo or Indian, which one would expect to be the custom if the Eskimo Dog is merely a Wolf, tamed. Hearne (1796) mentions that some Indians, on finding a Wolf's den, fondled the little cubs, and painted their faces with vermilion, but returned them to the den and made no attempt to rear them. He adds (p. 362) that " all the wolves in Hudson's Bay are very shy of the human race, yet when sharp set,

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they frequently follow the Indians for several days, but always keep

at a distance. They are great enemies to the Indian dogs, and frequently kill and eat those that are heavily loaded, and cannot keep up with the main body."

A comparison of available skulls indicates that those of Eskimo Dogs from eastern Labrador and western Greenland are constantly smaller than those of eastern wolves, the teeth markedly smaller. European investigators (Studer, 1901; Anutschin, 1881; Woldrich, 1882) have described skulls and other bones of large dogs from deposits of the later Stone Age — Neolithic — one or two of which, the so-called *C. f. itiostranzcivi*, *C. f. Jadojcnsis*, seem to be large animals much like Eskimo Dogs, and are considered as belonging to the same group.

Eiffle (1909) records a crossing of the Australian Dingo with an Eskimo Dog, in the Hamburg Zoological Gardens. The Dingo, a female, was an unusually pale reddish brown animal; the dog, a black East Siberian Sledge-Dog. The eight pups of this litter were more reddish in color than their mother, with slightly bushy tails, somewhat bowed upward. The old Dingo then paired with one of these reddish dogs, and produced eight young, five very pale like herself, three darker red. The ears of all the young were not at first erect, but became so in the course of five months.

Notes. — The accounts of the early voyagers leave no doubt that these large dogs were companions of the Greenlanders and American Eskimo before the coming of Europeans. Their use by the natives as sledge-animals makes them of prime importance in the Arctic conditions under which they live. Cranz and Egede, early Danish missionaries to Greenland, mention the dog-teams, and the latter

author gives a crude figure. Scoresby in his Greenland Journal, (1823, p. 203) relates finding at Jameson's Land in eastern Greenland, the skull of a dog in a small grave, probably that of a child. The Eskimo of this part of Greenland must have had very little contact with Europeans up to that time. Cranz, in his History of Greenland, alludes to this custom of the natives, who believe that by lading the head of a dog beside the child's grave, the animal will show the ignorant babe the way to the Land of Souls, for a dog can find its way everywhere.

Among early accounts of the Eskimo Dogs, several of special interest are given in Hakluyt's Voyages. In The second voyage of Master Martin Frobisher, made to the West and Northwest regions, in the yeere 1577 (Hakluyt's' Voyages. Everyman's Library ed., 5, p. 137), it is related that a landing party at York Sound examined

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the deserted tents of the Eskimos, "not taking any thing of theirs except one dogge." The possessions of these people are described, including "also dogges like unto wolves, but for the most part black, with other trifles, more to be wondered at for their strangeness, then for any other commoditie needfull for our use." Again, "they frank or keepe certaine dogs not much unlike Wolves, which they yoke together, as we do oxen & horses, to a sled or traile: and so carry their necessities over the yce and snow from place to place: as the captive,

whom we ha^{ve}, made perfect signes. And when those dogs are not apt for the same use: or when with hunger they are constrained for lacke of other \ictuals, they eate them : so that they are as needfull for them in respect of their bignesse, as our oxen are for us."

At Leicester's Island, in the present Frobisher Bay, a captive Eskimo caught one of the Englishmen's dogs and showed how the natives trained their animals. In the narrator's words, " Taking in his hand one of those countrey bridles, he caught one of our dogges and hampred him handsomely therein, as we doe our horses, and with a whip in his hanfl, he taught the dogge to drawe in a sled as we doe horses in a coach, setting himselfe thereupon like a guide: so that we might see they use dogges for that purpose that we do our horses They drawe with dogges in sleads upon the yce, and remoo^l'e their tents therewithall wherein the^l dwell in Sonuner." This seems to l)e the earliest account of P^{sk}nno Dogs in Arctic America by Englishmen. It is interesting to find that the explorers carried a dog with them from Europe, showing the possibility at an earl^y- date, of contamination of the breed with European dogs. John Davis, who sailed from England in June, 1585, " for the discoverie of the Northwest passage," met with Eskimo Dogs in August, in Cumberland Sound. His chronicler relates that here " we heard dogs houle on the shoare, which we thought had bene volves, and therefore went on shoare to kill them. When we came on land the dogges came presently to our boat very gently, yet we thought they came to pray upon us, and therefore we shot at them, and killed two: and about the necke of one of them we found a leatherne collar, wjiereupon we thought them to be tame dogs. There were twenty dogs like mastives with prickt eares and long bush tailles" (Hakluyt's Voyages, Everyman's Library

ed., 5, p. 289).

At the present day, it is unusual to see typical Eskimo Dogs south of Hamilton Inlet on the Labrador east coast, though many mongrel individuals are found about the settlements between there and Newfoundland. Three centuries ago, however, the natives of the latter

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island had dogs which from their apparent resemblance to wolves, may have been of the Eskimo breed. For Whitbourne, in his "Discourse and Discovery of Newfoundland" (London, 1622) writes that the natives of Newfoundland "are a people that will seeke to revenge any wrongs done unto them or their Woolves, as hath often appeared. For they mark their Woolves in the eares with several markes, as is used here in England on Sheepe and other beasts, which hath been likewise well approved. For the Woolves in these parts are not so violent and devouring as Woolves are in other Countries." The same writer speaks with astonishment of his own mastiff's familiarity with these tamed "Woolves" (Mercer, 1897), which it seems reasonable to conclude were really Eskimo Dogs.

Of the Eskimo Dog in Greenland, BroMii (1868, 1875) considers the breed to be practically the same as that of Davis Straits and Kamtschatka. In western or Danish Greenland he found it more or less mixed with dogs of European descent and south of Holsteensborg not

used by the Eskimo, as the sea is not sufficiently frozen over in winter for sledging. The same author adds that in 1861, Prof. Otto Torell brought several dogs from Greenland for the use of his expedition in Spitzbergen, where on account of the open water they were found useless and set free. Within a few years they were said to have increased in numbers.

Plains-Indian Dog.

Characters. — Size medium, slightly smaller than the Eskimo Dog; ears large, erect; tail drooping or slightly upcurved; coat rather rough, usually "ochreous tawny" or "whitish tawny," or sometimes black and gray, mixed with white.

Distribution. — ^ Western North America from British Columbia south perhaps to the Mexican Boundary and eastward through the Great Plains Region.

Notes and Descriptions. — It is apparently to this dog that most of Lord's description (1866, 2, p. 222) applies in his Naturalist in Vancouver Island and British Columbia. So impressed was he by the general similarity of these dogs to coyotes, that he believed the one derived from the other, and makes one general description do for both, with the addition that in the dog the hair "becomes shorter, softer, and more uniform in coloration, although the tail retains its bushy appearance." The general color is an "ochreous grey," the hairs tipped with black, those of the neck tricolored, having their

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"lower two-thirds reddish brown; then a ring of white, and a black tip." This pattern gives "a most curious speckled look" to the bristling neck of an enraged dog. Coues (1873) was equally impressed by the general resemblance of these dogs of the Plains Indians to coyotes and considered the two animals essentially the same in structural points, though he thought it "unnecessary to compare the skulls." Indeed, he accepted it as unquestionable that in every Indian community mongrel dogs are found, shading into coyotes in every degree. Such crosses he says, are obtained by picketing female dogs over night at proper times, thus allowing them to cross with coyotes. Morton (1851) quoting a letter from Dr. Cooper, Fort Duncan, Texas, speaks of ever}- ranch having a dog resembling a coyote, "and a bitch to which no dog had had access, produced whelps, evidently a cross with the Coyote^ Wortman, also (in Cope and Wortman, 1884, p. 8, footnote) after extended travel in the western United States corroborates Coues — but from hearsay evidence, however. He found among the Umatillas, Bannocks, Shoshones, Crows, Arrapahoes, and Sioux, mongrel dogs, " which to one familiar with the color, physiognomy and habits of the coyote, have every appearance of blood relationship," if they are not " in many cases, this animal itself in a state of semi-domestication." All such evidence, however, is unsatisfactory, and rests on general resemblances in form, color, and characteristics that may be common to both animals. A comparison of skulls and teeth would perhaps reveal more significant tokens of the true relationship,

but hitherto nothing has been published as to the cranial characters of such animals. Yet, in his much-quoted paper on the origin of the American varieties of the dog, Packard (1885) appears to have been influenced by Coues's belief, and agrees with him in considering these dogs as merely tamed coyotes. In a journey through provincial Mexico he was struck by the general resemblance of the native dogs to these animals, and again, in 1877, on the upper Missouri took special note of the dogs of the Crow Indians, describing them as of wolf-like appearance, of the size and color of a coyote — a whitish tawny — but less hairy and with less bushy tails. Lord (1866, 2, p. 221) found a number of dogs with a little tribe of Indians at Sweltza, a small lake west of the Cascades, near which the boundary of British Columbia passes, "that were hardly in any degree altered from the coyote" in exterior appearance. He speaks of their burrowing deeply into the ground to bring forth their young, but this trait is found in dogs as well as in coyotes. From these accounts it is clear that the general appearance and coloration of this dog are strikingly

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like those of one of the coyotes. Hamilton Smith (1840, p. 156) refers to the same dog as the "Techichi of Mexico, or the Carrier-dog of the Indians," and gives a figure (Pl. 4) of the only example he had seen, a tawny dog of normal proportions and with cropped ears. He confuses it however, with Richardson's "Carrier-Indian" or Short-legged Dog and further complicates his account by supposing it the

same as the Mexican Techichi.

James Teit (1909) writing of the Thompson Indians of the upper Fraser River, British Columbia, also remarks on the general resemblance of their dogs to coyotes, but adds that through intercrossing with dogs imported by the whites, the breed has become totally extinct. They were good hunters, though poor watch-dogs, and the best ones for deer hunting were highly prized. Such dogs generally ran the deer to water, often bringing it to bay in some creek, and keeping it there till the Indian came up and dispatched it.

It is regrettable that more thorough comparison of the teeth of these dogs could not be made to test any supposed resemblance or relationship to coyotes. As Gidley (1913) has pointed out, the fourth lower premolar of the latter has normally two secondary cusps and a cingulum, that of the dog normally but one secondary cusp, a ready means of distinction in addition to other relative characters. It should be added that in numerous fragments I have examined from the southwest, there is no evidence of coyote influence.

Referred to this same breed are perhaps the larger dogs mentioned by Suckley (Suckley and Gibbs, 1860, p. 112) as kept by the Indians "about the Dalles of the Columbia," Oregon. These he describes as about the size of a foxhound, but much more slender, in color yellow or brindled.

A similar type of dog seems to have been kept by the Indians of California. At all events, a series of skulls from mounds on the southern coastal islands are hardly to be distinguished from New Mexican

skulls. A skull found in association with that of an Indian, washed out after a freshet, from a bank at the junction of the Tuolumne and San Joaquin Rivers, California, is of the same medium-sized type, rather heavy of bone, slender of muzzle, and with feeble sagittal crest, mainly on the occiput.

Skeletal Measurements. — A cranium discovered in the course of excavations by Dr. A. V. Kidder at Pecos, New Mexico, may be attributed to this dog. It is nearly identical in size and proportions with several of the skulls from southern California from mounds on the island of San Nicolas, kindly loaned me by the Archaeological

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Department of the University of California. These last are in an excellent state of preservation, of medium size, yet of massive bone, with roughened brain-case, and sagittal crest developed mainly on the interparietal region. The teeth are rather small, the first upper premolar lacking in some cases.

The following table gives the cranial measurements of several of these skulls. The first two, from Pecos, N. Mex., differ in that the one, a rostrum only, is considerably larger than the other, or any of the Californian skulls. Of the latter, there are several from mounds on San Nicolas Island, which represent a dog apparently identical with that of New Mexico. The last two columns give dimensions of

two old dogs with much worn teeth; in the larger, indeed, the upper molars have been lost and their alveoli partially filled, while the remaining teeth are mere stumps. The smaller of these two skulls, while not very different in the measurements of the tooth-row, has a shorter, smaller cranium. It is very likely a mongrel between this larger dog and one of the short-nosed dogs ('Pachycyon'), a relationship further indicated by its slightly more upturned snout. It is further peculiar in lacking the first upper premolars on both sides, while in the lower jaw there are on both sides four molars, the second and third each with two roots and the fourth single-rooted like the usual third molar. Four molars in the lower jaw is not an unknown feature in the dog. Nehring (1882) found twenty dog skulls out of 650 in which there was an extra molar either in both upper or both lower tooth-rows, or in only one tooth-row.

Lucas (1897) has given a brief account of the cranium of a large dog, evidently domesticated, found in an ancient Pueblo Indian grave at Chaves Pass, Arizona, in 1896. Another of similar proportions was discovered at San Marcos, Texas, associated with Hinds, a human skeleton, and other bones. The former skull he regards as of a "broad-faced type," and describes it as "precisely similar in size and proportions to the cranium of an Eskimo dog from Cumberland Sound." He supposes these to be carrier-dogs, and recalls Clavigero's mention of them as "a quadruped of the country of Cibola [New Mexico], similar in form to a mastiff, which the Indians employ to carry burdens." I have not been able to examine these skulls, but they may be the same as the larger of the two New Mexico skulls here listed.

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Uses. — These dogs of medium size, were chiefly used by the Indians in transportation, secondarily in hunting. In the plains country from Saskatchewan to the Mexican Boundary, the travois was in general use. This consisted of two light poles, the smaller ends fastened together and resting on the dog's shoulders, the heavier ends

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kept apart by a crosspiece and trailing behind. A leather collar served to keep this frame in place for dragging the goods piled upon it. In this way entire villages moved, the dogs dragging the household effects. The contrivance seems not to have been used west of the Rocky Mountains. Perhaps the earliest mention of the use of these dogs as pack-animals is found in Coronado's account of his journey in 1540 to 1542, from the City of Mexico to the Texas plains (see translation l)y Winship, G. P., 1904). When some ten days' march from the present Rio Pecos, Texas, Coronado and his followers came to Haxa, where the natives were found to have "packs of dogs." In moving camp, these Indians started off "with a lot of dogs which dragged their possessions." "They travel like the Arabs, with their

tents and troops of dogs loaded with poles and having Moorish pack saddles with girths. When the load gets disarranged, the dogs howl, calling some one to fix them right." A letter from one of Coronado's men further describes the dogs. "These people," he writes, "have dogs like those in this country [Spain], except that they are somewhat larger, and they load these dogs like beasts of burden, and make saddles for them like our pack saddles, and they fasten them with their leather thongs, and these make their backs sore on the withers like pack animals When they move — for these Indians are not settled in one place, since they travel wherever the cows [i. e., Bison] move, to support themselves, these dogs carry their houses, and they have the sticks of their houses dragging along tied on to the pack saddles, besides the load which they carry on top, and the load may be, according to the dog, from 35 to 50 pounds." Evidently these were the carrier-dogs of the Plains Indians, and the method of packing with the tent poles used as travois seems to be here first described.

As pack-animals, for moving camp in their pursuit of the Bison, these dogs were of great service to the Indians of the plains country, and every village was provided with troops of them.

As an article of food, the dog seems to have been somewhat analogous to the fatted calf. George Catlin (1841, 1, p. 14) writing of the Upper Missouri Indians, says: "We are invited by the savages to feasts of dog's meat, as the most honourable food that can be presented to a stranger."

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Sioux Dog.

Character.s. — A large wolf-like dog, probably closely related to the Plains-Indian Dog but larger and gray rather than tawny in color.

Distribution. — Probably the north-central plains area, from the Missouri north perhaps to Saskatchewan.

Notes. — No doubt the carrier-dogs differed slightly among the various tribes of Plains Indians covering the wide stretch of country from Northern Mexico to Saskatchewan, so that local breeds of the general type could be distinguished did we have opportunity to compare them. Morton (1851), who tried to obtain information from frontier officers in the earlier half of the last century, quotes a letter from H. H. Sibley, a correspondent in Minnesota, who avers that "the Indian Dog differs much in size and appearance among different tribes" but that they all have small, sharp, erect ears. He particularly recalls that "among the Sioux, it is large and gray, resembling the Buffalo Wolf." Packard (1885) has mentioned "whitish tawny" Indian dogs seen in 1877, among the Crows of the upper Missouri. Lewis and Clark, on their famous journey, came upon a scaffold burial of an Indian squaw, near which lay two dog-sleds and the carcass of a large dead dog, between Mandan and the Yellowstone. These large gray dogs of the Sioux may have been a distinct breed from the tawny dog, of the size of a Coyote, and possibly the same as

certain large dogs seen by Hind (1859) among the Crees of the Sand Hills. Sir John Franklin (in his Journey to the shores of the Polar Sea, 1829, 1, p. 176) briefly mentions the large dogs of the Crees in the Saskatchewan country. He adds that in the month of March, the female wolves "frequently entice the domestic dog from the forts, although at other seasons a strong antipathy seemed to subsist between them."

Hamilton Smith (1840) quotes an interesting letter from Prince Maximilian of Wied, likening the North American plains dog to a wolf, "excepting that the tail is more curved, and the color either "absolutely grey like wolves" or white, black, and black and white spotted. The latter coloring, however, may apply to some other breeds than that under consideration.

Figures probably representing this dog, are shown in some of the plates of Catlin's Indians (1841, colored edition, 2) small to be sure, but showing the gray coloring, large erect ears, and scimitar-shaped tail carried out behind. His Plate 103 in 2 is a spirited drawing illustrating a dog-fight in which all the dogs of the party, though burdened with their loads "en iravois," are rushing to participate.

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Long-haired Pueblo Dog.

Characters. — A medium-sized dog of slender muzzle, erect ears, and normal bushy tail. Hair long and dense, pale yellowish, clouded with dark brown on ears and crown, whitish beneath on throat, belly, and feet. Feet well-haired. Probably this is to be looked upon as a local breed of the Plains-Indian Dog, from which it apparently differs only in its longer coat.

Distribution. — Known only from the Marsh Pass region of Arizona, but in former times probably common to the Pueblo tribes of Arizona and New Mexico.

General Account. — One of the remarkable discoveries of Messrs. Guernsey and Kidder, while exploring for the Peabody Museum, was an excellently preserved specimen of a medium-sized dog associated with a human burial. In the arid climate of Arizona, the dog had merely dried, so that the entire animal even to the thick hair was nearly intact. It is covered with a dense coat of long woolly hair, of a pale yellowish color, clouded on the back and head with brownish. On the sides of the body, the length of the hair is about 100 mm.; on the toes 30 mm. The culture period to which this specimen belongs, is believed by Mr. Guernsey to antedate that of the Cliff Dwellers, and hence must be at least several centuries old.

It seems probable that it was to this long-haired dog that Mendoza, a companion of Coronado, refers in a letter of 17 April, 1540, to the King of Spain, describing the pueblo of Cibola, then a famous Indian site, near the present town of Zuni, New Mexico. This letter is translated by Winship (1904, p. 153) from the Spanish of Pacheco y Car-

denas, (Documentos de Indias, 2, p. 3.50), and contains the following passage:—"In their houses they keep some hairy aniinals, like the large Spanish hounds, which they shear, and they make long colored wigs from the hair, like this one which I send to Your Lordship, which they wear, and they also put this same stuff into the cloth which they make." These "hairy animals, like the large Spanish hounds," seem probably, in the light of Mr. Guernsey's discovery, to have been the same as the dog found at Marsh Pass. It is recalled here that breeds of long-haired dogs were kept for shearing not only by the Indians of Puget Sound, but by the Chonos of the Taitao Archipelago, Chile, and their hair woven into blankets (see p. 475). There was fonnerly a breed of long-haired white or brown dogs among the aboriginal inhabitants of New Zealand, the prodiict of which was similarly u.sed (Colenso, 1878).

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External Measurements. — It is not possible to remove the skull and limb-bones without injuring the mummy for exhibition purposes.

A few dimensions, however, follow: —

Length from nose to root of tail, following backbone — about 700 nun.

Length of tail, (bnjken at tip) slightly over 200

Hind foot ' 141

Femur (approximately) 140

Tibia (approximately) 143

Upper jaw, front of canine to back of pm* 55.5

Upper carnassial (pm*) 18

Length of skull from occiput to tip of nose (approximately) . . 195

Width outside upper canines 31

" " carnassials 54

Zygomatic width — about 95

Lower jaw, front of canine to back of mi 68 . 5

« u u n 11 ii « a AQ

" ' jtiHi to pnii 35

Length of lower carnassial 21

Larger or ("omox Indian Dog.

Plates 7, 8. .

1817. Cants fdniiliiris <uncricanus canadensis Walther, Hund, p. 43.

1829. *Canis familiaris* YAr. c. *canadensis* Richardson, *Fauna Boreali-Amer.*, 1,

p. 80 (not *Canis lupus canadensis* Blainville 1841, which is *Canis lycaon*

Schreber) .

1834-6. *Canis canadensis* Reichenbach, *Regn. anim.*, i)t. 1, p. 46, fig. 564.

Canis familiaris urtholu^ cniiadcnis Reichenbach, *Naturg. raubth.*.

p. 146, fig. 564.

1867. *Canis domesticus borealis luparius* Fitzinger, *Sitzb. K. akatl. wiss. Wien*,

56, pt. 1, p. 409 (not C. ./'. nrt-hotus *luparius*>i Reichenbach, *Regne anim.*,

pt. 1, p. 13, fig. 131; not *Cants donieslicu-i luparius* Fitzinger, *Sitzb.*

K. akad. wiss. Wien, 1866, 54, pt. 1, p. 406; 1867, 56, pt. 1, p. 396.

1881. *Canis lutrans domesticus* Langdon, *Journ. Cine. soc. nat. hist.*, 3,

p. 299 (not *Cam's ftnniliaris domesticus* Linne, 1766).

Characters. — This was probably closely related to the Plains-Indian Dog, but seems to have been usually solid black or black and white in patches instead of resembling the Coyote in color. The skull has, when adult, a knife-like sagittal crest, a high forehead, and is rather slender. Limbs much longer than in the Short-legged Indian Dog

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yet slightly inferior to those of a Greyhound. The first lower pre-molar was frequently wanting.

Distribution. — Dogs of this general type, agreeing fairly well in size and proportions were found among the forest Indians from Alaska southward to Florida and the Greater Antilles, and westward to the edge of the plains in the east central States. The more northern dogs seem to average a little larger than those from the south, but in the absence of more exact knowledge seem best referred to this type. No doubt in the far Northwest there was more or less mixture with the Eskimo Dog. Probably too, local strains of this general type of dog could be distinguished, did we know their external characteristics, but the skulls and teeth seem remarkably similar over a wide area.

Skeletal remains. — Cope (1893) was the first to describe the jaw of this dog from a specimen collected by Moore from a shell-mound on St. John's River, Florida. He was struck by the fact that the first lower premolar was missing and appeared not to have developed. The strong development of the entoconid of the carnassial, he also noticed. Moore, in the course of various explorations in Florida and Georgia discovered many remains of dogs, apparently of this type. In a large mound on Ossabaw Island, Georgia, he (1897) found several interments of human and dog-skeletons, the latter always buried separately and entire, showing that the dogs had not been used as food. Other dog-skeletons of a similar sort were found by Moore (1899) in

aboriginal mounds on the South Carolina coast. Several of the skulls collected by him are in the Peabody Museum, where I have had the privilege of studying them. Putnam (1896) considered them the same as those of the larger Madisonville dogs. More recently the M. C. Z. has received from Prof. Carlos de la Torre, two fragmentary skulls of dogs associated with pre-Columbian burials in Cuba. These skulls seem to be essentially similar as far as can be judged. Miller (1916) has reported a lower jaw of a dog from an Indian site in Cuba.

Three crania in excellent condition, from the INladisonville, Ohio, site agree in their somewhat slender proportions, with narrow palate and rostrum. A strong but thin bony crest is developed along the midline of the brain-case, and there is a noticeable inflation of the region just back of the supraorbital processes. The first premolar is absent in both eraniimi and jaw of one specimen. Two crania from a shell-heap at La Moine, Maine, similarly lack the first premolar. One of these latter is a much larger skull than any of those from MadisonA-ille, which may indicate some variation in the local breeds.

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yet the general type seems to be the same. Hardly distinguishable from the Maine specimens in any way is a skull from Peel River,

Yukon, (U. S. N. M. 6,219) collected about 1860 by Kennicott and representing probably the common Indian Dog of that region.

Crucial Measurements

Alveolus of i' to occipital condyle .

Median length of nasals

Alveolus of i^\wedge to median edge of

palate

Alveolus of i^\wedge to anterior edge of

orbit

Alveolus of i^\wedge to m-

" " canine to ni-

" " pi to w2

" pUo m2

Alveoli m^\wedge and ni^\wedge

Length of p^\wedge

Width of occipital condyles

" " palate at ni^

" " across supraorbital

processes

Zygomatic width

.2§

^ .

o a,

170

56

85

74

86

72.5

60

52

18.2

19

31

59

50

102

a

a

172

62

90

77.5

90

75

62.5

56

18

37.5

57

51

98

0

•5

O &H

163

57

87

74

87

72

55

20.8

18.6

34

61

47

104

177

88

81

96

79

62.5

19

20.5

40

66.5

49

101

c 00'

163

57

86

74

86

71

59

52

17

17.5

36

54

46

92

\wedge CO

c .

•: §

cs .

169

57

90

77

90

74

60

52

17

18.5

34

60

57

104

N

74

64

55

16.3

38

62

Cl

o

03

192 ±

93

86

20.8

40

68

60

168

70 ±

83

70

56

19.8

19.7

37

Of seven lower jaws from Maine shell-heaps, all but one lack the first premolar, and the same tooth is lacking in a ramus from Madisonville. It seems to be missing in the greater portion of lower jaws of this dog. The following measurements show the lengths of different parts of the tooth-row taken at the alveolar borders, because the teeth themselves are frequently lost.

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Skeletal Measurements. — The first of the Calf Island jaws above, is accompanied by parts of the skeleton of the same animal. The limb-bones of this skeleton and those of several dogs from Madisonville, Ohio, measure:

Notes and Discoveries. — On account of the finding of cranial fragments that appear to represent this animal, in aboriginal burials in Cuba, it is assumed that this is the dog mentioned by the first discoverers under Columbus. Oviedo (1535) writing of the aboriginal dogs in Haiti shortly after the discovery, declared that they were no longer to be found there in 1535, as all had been killed for food during a time of famine. These dogs he described as of all the colors found

among the dogs of Spain, some uniformly colored, others marked with blackish and white, or reddish brown. The coat of some was woolly, of others silk\ or satiny, but most of those in Haiti were between silky and satiny, yet rougher than the Spanish dogs; with ears pointed and

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erect like those of wolves. None of these dogs barked. Oviedo adds that similar dogs were plentiful in many parts of the continent, as in Mexico, Santa Marta, and Nicaragua. He had eaten their flesh and considered it excellent, resembling lamb. In Nicaragua and Mexico the Indians bred numbers of them and at their great festivals dog-meat was considered the best dish of all. The natives of Haiti hunted some species of Hutia with these dogs.

Very little seems to have been written descriptive of this breed.

In his essay on the origin of dogs, Hunter (1787) mentions that a Mr. Cameron, who had lived among the Cherokee Indians, informed him that the dog found in their country was "very similar to the wolf."

Cameron thought it remarkable there were not sundry breeds of dogs among these Indians, as in Europe. William Bartram (1792, p. 220), during his travels in Florida, made special note of a " single black dog, which seemed to differ in no respect from the wolf of Florida, except his being able to bark as the common dog." It belonged to an Indian, who had trained it to tend a troop of semiwild horses, " keeping them in a separate company where they range; and when he is hungry or

wants to see his master, in the evening he returns to town, but never stays at home at night." Barton (1805) appears to have made more particular inquiry of Bartram concerning these Indian Dogs of Florida, and describes them as " very similar to the Canis Lycaon, or black wolf," yet they are not always black "but of different colours, commonly of a bay colour, and about one third less than the wild black wolf. It carries its ears almost erect, and has the same wild and sly look that the wolf has." Barton adds that the dogs of the Cherokees were already (1805) much intermixed with the European dogs.

Peter Kalm informed John Bartram that the dogs of the Canadian Indians (?Montreal) were like those in Sweden with erect ears, and Bartram himself (in a letter to George Edwards, 1757) recalled as a boy seeing the Indian Dogs, with erect ears, accompanying their masters on occasional visits to his father's house in Pennsylvania. Barton (1805), who seems to have made diligent inquiry about these dogs, further describes their aspect as "much more that of the wolf than of the common domesticated dogs. His body, in general, is more slender than that of our dogs. He is remarkably small behind. His ears do not hang like those of our dogs, but stand erect, and are large and sharp-pointed. He has a long, small snout, and very sharp nose." This breed, he says, was still preserved in the greatest purity among the Six Nations, from whom the Delawares acknowledge that they received it.

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Judging from the numerous shell-heap remains of what seems to be this same dog, it was formerly common among the New England Indians. In Hakluyt's *Voyages* (Every-man's Library ed., 6, p. 95) is an account of The voyage of the ship called the Marigold of Mr. Hill of Redrife unto Cape Briton and beyond to the latitude of 44 degrees and an half, 1593. The narrator tells of meeting with a party of " Savages" at Cape Breton in July, who upon the accidental discharge of a musket, came " running right up o'er the bushes with great agilitie and swiftnesse. . .with white staves in their handes like halfe pikes, and their dogges of colour blacke not so bigge as a greij'hounde followefl them at their heeles; but wee retired unto our boate."

It is probably to this breed of dog that Charlevoix refers in his *Journal of a voyage to North America* (London, 2 vols, 17(U, transl.). "The Indians," he writes, "always carry a great number of dogs with them in their huntings; these are the only domestick animals they breed, and that too only for hunting; they appear to be all of one species, with upright ears, and a long snout like that of a wolf " (1, p. 187).

This is the "major" type of Indian dog reported by Loomis and Young (1912) from Maine shell-heaps, where rather large-sized specimens have been discovered. Dog-remains have been found also in Connecticut (MacCurdy, 1914) and Block Island, R. I. (Eaton, 1898).

An Indian Dog-skull (Plate 7) collected by Kennicott on the Peel River, about 1860 (U. S. N. M. 6,219) is hardly different, except for its very slightly greater size, and seems best referred to the same sort of dog, though possibly a distinguishable breed. Richardson (1829) named this dog *Canis familiaris* var. *canadensis*, and says it is the kind "most generally cultivated by the native tribes of Canada and the Fur countries." He describes it as intermediate in size and form between the Eskimo and the Hare-Indian Dog. Its fur is black and gray, mixed with white; some are all black. Apparently identical with the skull from Peel River is another collected by Dr. W. H. Dall, from a prehistoric Aleut village site in Unalaska. Dr. Dall notes that this is the only dog-skull which had been found in the undeniably prehistoric kitchen-middens of the Aleutian Islands. It still retains the upper carnassial, which measures 20.5 mm. in length. The occipital condyles are 38 mm. across. The first upper premolar was apparently lacking.

Probably it was a dog of this breed that Audubon figured as the Hare-Indian Dog, from a living one in the gardens of the Zoological

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Society of London. Bernard R. Ross (1861) seems to have confused the two as well; for a skull collected by him at Fort Simpson and sent to the U. S. N. M. as "*Canis laevis*" is even larger than the one from Peel River and almost undoubtedly a cross with an Eskimo

Dog. Both skulls lack the first lower premolar.

In the North the Common Indian Dog is largely used among the forest Indians as a least of burden.

Samuel Hearne, on his famous journey to Peel River, 1769-72, observed that the Indians' "kettles, and some other lumber, are always carried by dogs, which are trained to that service, and are very docile and tractable. * * * These dogs are equally willing to haul in a sledge, but as few of the men will be at the trouble of making sledges for them, the poor women are obliged to content themselves with lessening the bulk of their load, more than the weight, by making the dogs carry these articles on their backs, which are always lashed on their backs, much after the same manner as packs are, or used formerly to be, on pack-horses."

Klamath-Indian Dog.

Characters. — A medium-sized dog, with a short, bushy tail.

Distribution. — So far as known, this peculiar breed was found only among the Indians in the Klamath River region of Oregon.

Remarks. — The only mention of this dog that I have found is the following by Gibbs (Suckley and Gibbs, 1830, p. 112):

"On the Klamath is a dog of good size, with a short tail. This is not more than six or seven inches long, and is bushy, or rather broad, it being as wide as a man's hand. I was assured they were not cut,

and I never noticed longer tails on the pups. They have the usual erect ears and sharp muzzle of Indian dogs, but are (what is unusual with Indian dogs) often brindled gray."

Presumably the shortened tail arose as an independent variation among dogs of the Plains-Indian Dog type and was preserved among these dogs through selective breeding. Similar short-tailed breeds are well known among European dogs, as in the English Sheep-dog, and certain varieties of Bull-terriers. MacFarlane (1905, p. 096) gives an account of a very much prized Eskimo Dog he owned in the Mackenzie District, that was born tailless and undersized, but proved an excellent sled-dog.

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Short-legged Indian Dog.

Plate 5, fig. 1.

1829. *Canis familiaris* var. *d. novae caledoniae* Richardson, Fauna Boreali-

Amer., 1, p. 82.

(?) 1912. *Canis familiaris*, minor Indian dog, Loomis and Young, Amer.

Journal. sci., ser. 4, 34, p. 26, fig. 4, D.

Characters. — Ears erect, head large in proportion, and body long;

the legs relatively short but not distorted as in our Turnspits. Fur of the body short and sleek, that of the tail longer. This is possibly a derivative of the Common or Larger Indian Dog.

Distribution. — It is hardly possible to trace the former distribution of this type of dog. It was found by Ptichardson in southern British Columbia, and a dog apparently similar is known from Quebec, and perhaps formerly in New England and New York. Probably it was found among canoe-using or forest-living tribes in the North, hence was infrequent or absent in plains country.

Notes and Descriptions. — Apparently Ptichardson (1829) was the first to take special note of this breed. He found it among the Attnah or Carrier Indians of "New Caledonia," (now British Columbia) and it seems to have been bred as well by neighboring tribes as far south at least as northern California. For Gibbs (Suckley and Gibbs, 18f)0, p. 112) makes particular mention of seeing "one peculiar looking dog on Eel River, in the interior of northern California, among very wild Indians. It had short legs and long body, like a turnspit." Suckley in the same work, briefly says that " the Indian dogs about the Dalles of the Columbia [Oregon] are so varied in appearance that no special description can be given. We might, however, make two types. The large * * * and the small, resembling the ' turnspit kind ' of which Mr. Gibbs speaks. The latter are generally white, or spotted liver and white, or black and white. This kind is kept more as a playmate for the children and a pet for the women."

It is significant that Suckley mentions the "varied" appearance of

the Oregon dogs, so that it was possible to refer them in general to but two types. This may have been a result in part of the interbreeding of the larger and the smaller types, and in part perhaps of a mixture as Suckley suggests with European breeds already introduced.

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Although generally associated with the Indians of British Columbia and neighboring parts of the northwestern United States, it seems likely that this or a similar breed may have been much more widely distributed over northern North America, as far east and south as Quebec, New P[^]ngland, and New York, if not farther. An excellent photograph given me by Mr. W. B. Cabot (Plate 5, fig. 1) was obtained a few years since among the Bersimis Indians, Quebec, and seems to represent a dog of the same general type. The large head, erect ears (somewhat laid back in the photograph), long, heavy lwdy, short, straight legs, up-turned tail, agree well with other descriptions. This particular individual has the spiritless air of an old dog.

That this breed of dog was found at least as far south as the southern coast of New England, may possibly be inferred from the account by Livermore (1877, p. 58) of the dogs of the Block Island Indians, of Rhode Island. This isolated colony of Indians numV)ered some ;^00 individuals up to the year 1700, but by 1774 was reduced to only ")1. In 1876, there was known to be but a single one living on the island.

According to the author just mentioned, "the 'dogs' of Block Island belonging to the Manisseans before the English came have their descendants here still, it is believed. They are not numerous, but peculiar, differing materially from all the species which we have noticed on the mainland, both in figure and disposition. They are below a medium-size, with short legs but powerful, broad breasts, heavy quarters, massive head unlike the bulldog, the terrier, the hound, the mastiff, but resembling mostly the last; with a fierce disposition that in some makes but little distinction between friend and foe." The description here given, unsatisfactory though it be, implies a dog much like that shown in fig. 1, Plate 5.

Skeletal Remains. — I am unaware of the existence in any museum, of bones that may be definitely associated with the Short-legged Indian Dog. But, as pointed out by Loomis and Young (1912), there are in the prehistoric shell-heaps of the New England coast remains of a larger and a smaller Indian Dog, the latter of which on the strength of the evidence just given as to the former presence of the short-legged breed in eastern Canada and New England, may tentatively be referred to this animal. The authors mentioned have characterized the lower teeth of this smaller dog on the basis of jaws from the Maine shell-heaps and through the kindness of Professor Loomis I have had opportunity to study the specimens.

The mandibles are all more or less broken, but include several in fairly good condition. They differ from those of the Larger or Com-

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men Indiun Dog in the .smaller size of the individual teeth as well as in the shorter tooth-row. Yet the contrast is not all\va\'s very striking and no doubt there was more or less intercrossing of the two types. The teeth of the smaller dog are usually more close-set than those of the larger, and on comparison, the carnassial tooth is seen to be decidedly smaller, its metaconid sometimes quite obsolete, and with a distinct tendency for the outer of the two cusps of the heel (hypoconid) to become enlarged and trenchant. As in the Common Indian Dog, and in American aboriginal dogs generally, it is common if not usual, for the first lower premolar to be lacking, and the same is frequently true of the first upper premolar. Such an anomaly is occasional in all domestic dogs. Indeed, Bourguignat (1875) founded his genus *Lycorus* on such a fossil canid jaw — probably of a wolf — from a cavern-deposit in France. In his specimen the first premolar was lacking in each ramus.

Loomis and Young (11)12) mention similar small jaws from Indian sites in Arkansas.

Of limb-bones referable to the Short-legged Dog it is particularly desirable to obtain specimens for comparison with the other breeds. Among limb-bones in the Amherst collection from Maine are several longer and shorter. The latter in the lack of evidence to the con-

trary, may be regarded as having come from the present type. Of two humeri, one is nearly perfect and appears to be that of an adult animal, with its epiphyses thoroughly fused to the shaft. Its ole-

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cranial perforation is large and oval, somewhat less than half the breadth of the shaft at the same point. The deltoid ridge is typically prominent. The bone itself is slender and not in any way thickened or distorted. It measures: — greatest length, 130 mm.; antero-posterior diameter of head, 31; transverse diameter of head, 25; transverse diameter of distal end, 25.5; width of distal articular surface, 17. It is thus about three quarters the length of the humerus in the Larger or Common Indian Dog, proportionally slender, yet considerably longer than that of the Techichi. What is undoubtedly the radius of the same dog, measures 129 mm. in greatest length; 14.5 in diameter at the proximal and 19 at the distal end. A femur, possibly of the same specimen measures: — greatest length, 136 mm.; greatest transverse width of distal end, 25. It is thus slightly longer than the humerus, in the normal proportion. The limb-bones indicate a dog about the stature of a terrier or a basset-hound.

Among many isolated lower jaws from Maine shell-heaps are some in which the carnassial tooth is noticeably narrow and intermediate in size between that of the typical Short-legged Dog and the Larger or Common Indian Dog. These probably represent cross-bred

animals as Loomis and Young have suggested.

Uses. — These smaller dogs were apparently the familiar household pets or hunting companions of the Indians of forested country or of the canoe-using tribes. They were too small to be of service as pack-animals with travois or pannier, and hence seem not to have been much in favor with the Plains Indians, whose main subsistence was the Bison for the hunting of which, dogs were unnecessary. Suckley (1860) particularly mentions that they were kept more as a "play-mate for the children and a pet for the women" among the tribes of the Columbia River. Moreover, a small dog is a better companion in a canoe than a larger clumsy animal.

Richardson says of the Short-legged Dog, that it was used in the chase, was very active and agile at jumping. It was perhaps a dog of this type that was used in hunting the beaver. George Bird Grinnell (Forest and stream, 1897, 49, p. 382) writes that the Cheyenne Indians, before their intercourse with whites, hunted the Beaver with dogs, by breaking the dam and thus exposing the beaver houses and their underwater entrance. "The dogs which were small enough to enter this hole, and yet were pretty good sized animals, went into the hole " and worried the beaver till it followed the dog out, when an Indian waiting outside, clubbed the beaver to death. Le Jeune, in his Relation de ce qui c'est passe en la Nouvelle France [Quebec]

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en l'anne 1633 (Jesuit relations, 1897, 5, p. 165) mentions this use of dogs in Beaver hunting; "sometimes when the dogs encounter the Beaver outside its house, they pursue and take it easily; I have never seen this chase, but have been told of it; and the savages highly value a dog which scents and runs down this animal." Le Jeune speaks of the familiarity of the Indian dogs, that in winter they are unable to sleep outside and come into the cabins, lying and walking over the inmates. Elsewhere he speaks of giving food to a 'petit chien,' but adds that " the savages do not throw to the dogs the bones of female Beavers and Porcupines, — at least certain specified bones yet they make a thousand exceptions to this rule, for it does not matter if the vertebrae or rump of these animals be given to the dogs, but the rest must be thrown into the fire."

Testimony of early travellers is somewhat conflicting as to the eating of their dogs by the Indians. Le Jeune states that " in the famine which we endured, our savages would not eat their dogs, because they said that, if the dog was killed to be eaten, a man would be killed by blows from an axe." On other occasions, however, such scruples were not observed. Thus Father Rasles, in a letter written to his brother in 1716, from Narantsook, forty miles up the Kennebec River, Maine, says that at the news of the French and English War, the Indian young men were ordered by the older Indians to kill dogs for the purpose of making the war-feast (Jesuit relations, 1897, 67, p. 203) — possibly here with a view to sending their dogs on before, should death overtake their masters. Feasts of dog-flesh seem to have been commoner among the Indians of the West and South, and Fremont in his narrative of his explorations (1845, p. 42) recounts

being invited, as a mark of honor, to a dog-feast. " The dog was in a large pot over the fire, in the middle of the lodge, and immediately on our arrival was dished up in large wooden bowls, one of which was handed to each. The flesh appeared very glutinous, with something of the flavor and appearance of mutton. Feeling something move behind me, I looked round, and found that I had taken my seat among a litter of fat young puppies."

Harmon, writing in 1820, after nineteen years spent in travel through the Northwest from Montreal to the Pacific, speaks of the smaller dog used in hunting, and a larger dog as well. The latter is rank and not good eating like the former, of whose flesh the Indians and French Canadian voyageurs were very fond.

In the New England shell-heaps, the dog-remains occur either as burials — the entire skeleton undisturbed — or as scattered portions.

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as if the bones had been thrown out after the flesh was eaten. There seems, however, to be little or no evidence that the bones were cracked for marrow.

The Jesuit father Biard in 1616, mentions dogs, kettles, and axes as among the presents given by a young Indian to the father of his intended bride in payment for her. Among other customs of the

Indians of Arcadia, he recounts that at a funeral, dogs are presented the dying man, as well as skins, arrows, and so forth. The dogs are then killed in order to send them on before him to the other world, and their flesh is later eaten by the people (Jesuit relations, 1896, 3, p. 101).

Clallam-Indian Dog.

Plate 4, fig. 1.

1840. *Canis laniger* Hamilton Smith, Jardine's Nat. library. Mammalia-

10, p. 134.

1867. *Canis domeshcus*, *camtschatkensis longipilis* Fitzinger, Sitzb. K. akad.

wiss. Wien, 56, pt. 1, p. 406.

Characters. — A medium-sized dog, with erect ears, and bushy tail.

Hair rather thick and woolly; white, or perhaps brown and black.

Distribution. — Formerly found among the coast Indians of the Puget Sound region and Vancouver Island. Lord (1866, 2, chap. 11) asserts that these dogs seem to have first been kept by the Chinook Indians, once very numerous near the mouth of the Columbia River, and were thence carried to Puget Sound and Nainimo. The source of this information is not given, but it is worth remarking that Lewis and Clark make no mention of the breed on the Columbia. Vancouver found them near the then Port Orchard, and apparently at least as far up the Sound as - Admiralty Inlet. Hamilton Smith

implies that they were to be found at Nootka Sound on the west coast of Vancouver Island.

Descriptions. — The earliest account of this dog is that by the navigator, Vancouver (1798, 1, p. 266). In May, 1792, while at Port Orchard, Puget Sound, he writes: —

" The dogs belonging to this tribe of Indians [at Port Orchard] were numerous, and much resembled those of Pomerania, though in general somewhat larger. They were all shorn as close to the skin as sheep are in England; and so compact were their fleeces, that large portions

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could be lifted up by a corner without causing any separation. They were composed of a mixture of a coarse kind of wool, with very fine long hair, capable of being spun into yarn. This gave me reason to believe, that their woollen clothing might in part be composed of this material mixed with a finer kind of wool from some other animal, as their garments were all too fine to be manufactured from the coarse coating of the dog alone. The abundance of these garments amongst the few people we met with, indicates the animal from whence the raw material is procured, to be very common in this neighborhood; but as they have no one domesticated excepting the dog, their supply of wool for their clothing can only be obtained by hunting the wild creature that produces it; of which we could not obtain the least

information." Elsewhere he mentions a deer "they had killed on the island, and from the number of persons that came from thence, the major part of the remaining inhabitants of the village, with a great number of their dogs, seemed to have been engaged in the chase," this near Admiralty Inlet. Farther up Puget Island, 48° 2'N, 237° 57'W, at a large village " they were met by upwards of two hundred [Indians], some in their canoes with their families, and others walking along the shore, attended by about forty dogs in a drove, shorn close to the skin like sheep [this in June]" (Ibid., p. 284).

Hamilton Smith (1840) who, in addition to Vancouver's account, had information from an Indian who had resided two years at Nootka, speaks of it as a large dog, " with pointed upright ears, docile, but chiefly valuable on account of the immense load of fur it bears on the back, of white, and brown, and black colours, but having the woolly proportion so great and fine, that it may well be called a fleece."

Notwithstanding Smith's assertion as to the " brown and black colours" of this dog, it is not at all certain that this was the usual case. Suckley (1860, p. 112) says positively that "all the Clallam dogs that I saw were pure white; but they have the sharp nose, pointed ear, and hang-dog, thick appearance of other Indian dogs." Gibbs also (Ibid.) mentions their whiteness only, and adds that the very soft hair is sheared like the wool of sheep, and made into blankets, though at that time, 1860, it was "generally intermixed with the ravellings of old English blankets to facilitate twisting with [into] yarn."

Lord (1866) further remarks that this white, long-haired dog was

kept by only a few coast tribes near Vancouver. The dogs were confined "on islands to prevent their extending or escaping," and it differed "in every specific detail from all the other breeds of dogs

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belonging to either coast or inland Indians." He supposes it to be of Japanese origin, recalling the long-haired Japanese Lap-dog, which however, seems remote enough in other characters. Lord adds that in the manufacture of rugs from the hair of this dog, the Indians often added the wool of the Mountain Goat, or duck feathers, or wild hemp. They dyed the hair as well. He obtained several of these blankets along the coast for the British Museum. Newcombe (1909, p. 50) gives a further account of the method of making yarn from the hair, which he says, was removed from the dried skin of the dog with knives or pulled out after moistening the hide and "sweating" the hair to loosen the roots. The wool was then made into loose threads by rolling. With the introduction of Hudson's Bay Company blankets this industry has ceased and the dog was practically extinct at the time of his writing.

As to the origin or affinities of this breed, little can be said. Some writers have classed it with the Siberian and Eskimo dogs, but it is likely that it was a breed of the larger type of Indian dog. The disinclination to take to water, made use of by the Indians to confine the animals to islands, is a trait shared by the Eskimo Dog. The

precaution was possibly taken in order to prevent crossing with other breeds of Indian Dogs.

Windle and Humphreys (1890) in their table of cranial proportions of Eskimo Dogs, include those of a Nootka Dog in the British Museum. It is not clear, however, if it was from a dog of the breed under consideration, and as no actual dimensions are given, the figures are not comparable with other direct measurements.

I am indebted to Mr. (J. T. Currelly, Curator of the Royal Ontario Museum of Archaeology at Toronto, for a photograph (Plate 4, fig. 1) of the unique painting made at Victoria, B. C., in 1846, by Paul Kane and now at that Museum. In the foreground is one of the white woolly dogs in question, its apparently erect ears nearly hidden in the long hair of the head. Nearby an Indian woman is weaving a blanket, no doubt from yarn made of dogs' hair, a ball of which another woman in the background is spinning. The use of dogs' hair in making blankets is not confined to the Clallams. The ancient Zunis appear to have made similar use of it; and Bannister (1869) mentions an Indian blanket from Mackenzie River, woven of dogs' hair. The natives of New Zealand regularly employed dogs' hair for braiding and ornament.

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Inca Dog.

Plate 9.

1844. *Canis ingae* Tschudi, *Unters. liber die fauna Peruana. Therologie*,

p. 13, 249.

1885. *Canis ingae* peciarms Nehring, *Sitzb. Gesellsch. naturf. freunde*

Berlin, p. 5-13.

Characters. — This is the higer dog of the ancient Peruvians. It was about the size of a small Collie, but more heavily proportioned. Tschudi describes it as having the head small, snout rather sharply pointed, upper lip not cleft; ears erect, triangular, small; body short and strong, squarely built ("untersetzt"), legs rather short; tail about two thirds the length of body, fully haired and curled forward. Pelage rough, long, and thick; color dark ochre-yellow with dark wavy shadings; belly and inner side of limbs somewhat brighter than the ground color of the back. No light spots above the eyes.

The skull is heavy in proportion to its size, with a narrow rostrum.

The brain-case is rugose for the attachment of muscles, yet the temporal muscles, even in old dogs seem to little more than meet medially, so that at most only a low sagittal crest is formed in old animals except at the extreme occiput, where it is contrastingly marked, forming a high knife-edge on the median line of the interparietal. The palate shows a strong thickening at its posterior end, forming two low ridges one on each side between the last molar and the posterior narial opening.

Distribution. — The former distribution of this breed has not been definitely traced. Mummified remains are known from Ancon, Peru, and from various sites that have been excavated in that country. In Tschudi's time it appeared to be confined to the upland tribes of Indians. Of this type were all the mummies and skulls of dogs found by him in the ancient graves among the Sierras. It probably was kept by the Indians of northwestern Argentina as well.

Nomenclature. — Tschudi in 1844, was apparently the first to name this as a distinct breed of dog, *Canis incac*. Forty years later Nehring in writing of the dog-mummies from the ancient necropolis of Ancon, referred it to a collie-like type with the combination, *Canis ingavpccuarins*. It is, however, very different cranially and otherwise from the Collie.

Measurements. — The largest Inca Dog among those from Ancon

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studied by Xehring (1884a) was smaller than a Sheep-dog, with a skull about 172 mm. long, humerus 147, ulna 172, radius 140. A smaller one had a skull length of 165, head and body 060, tail including hair 240, humerus 130. In the lower jaws the first premolar was fre-

quently missing.

The following table gives measurements of the six largest skulls among a series of nine belonging to the U. S. N. M.

Remarks. — Writing about 1844, Tschudi describes the chief characteristics of this dog as treachery and mischievousness. Every Indian hut and shepherd of the Sierra and puna had several. They seemed to show a special antipathy toward white people. A European traveller approaching an Indian hut on horseback would be beset by these dogs springing up against his horse to bite his legs. They are courageous, and fight an enemy with determination, dragging themselves to the attack even when mortally wounded. The Indians train them to track and capture tinamous.

In their great work on the Necropolis of Ancon, Reiss and Stiibel include a brief chapter by Nehring (1884b) on the mummified remains of dogs discovered there. Some of these are figured and show a pale

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yellowish coloring with darker areas. In a more extensive article Nehring (1884a) gives a particular account of the dogs of Ancon. He first transcribes passages from Garcilasso de la Vega to show that the Incas had dogs previous to the Spanish conquest, and that the dog entered into certain religious rites of the Incas. A mummified

dog is described as having thick hair, shorter, however, on head and feet, thickest on neck and breast forming a kind of mane.~ The color was yellow, clear or soiled in places, with irregular brown-shaded areas. The tail was thick and bushy, wolf-like, also yellow. The ears of most of the specimens seemed to have been clipped. He suggests the North American Wolf or Coyote as the original source of the Inca dogs, but there seems no ground for the selection of either as an immediate ancestor.

More recently, Eaton (1916, p. 25) has recorded the discovery of dog-mummies with pre-Columbian burials at Machu Picchu, Peru. He adds that " dogs of this general type, though usually a little smaller than those figured in Reiss and Stiibel's Necropolis of Ancon, were frequently seen in the parts of the Cordillera that I visited, and these animals may be largely derived from the ancient stock. . . The modern Indian dogs of this ancient type are very wolf-like and manifest a most inconvenient fear of the camera." He suggests the obvious possibility of present-day mixture with breeds imported from Europe, and gives a reproduction (p. 50, fig. 47) of a photograph showing dimly an Indian with his dog.

The fine series of Peruvian dog-skulls in the U. S. N. M. contains nine that show complete gradation in size between the smallest (which I have considered more or less typical of the Techichi) and the largest which represents the Inca Dog. Since these skulls are more or less comparable as to age, it seems likely that the gradation in size is due to free interbreeding of the two sorts of dogs. The largest skull of the series (U. S. N. M. 176,309, of which the measurements have been given) is almost precisely matched by the skull of a Common Indian

Dog from Peel River, Arctic America, collected by Robert Kennicott about 1860 (U. S. N. M. 6,219). The only obvious differences are that the palate of the Inca Dog shows the peculiar thickened ridges at the posterior end and is much narrower across the occipital condyles. The latter characteristic is shared by the other dog-skulls from Peru in contrast with the northern dogs, and is no doubt among the latter a result of their use as sledge-dogs, for the greater development of the neck and chest muscles in hauling might well enough demand a broader support from the skull. This general similarity

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of skull and skeletal proportions probably indicates a closer relationship with the larger Indian dogs of northern North America, than with the Wolf or Coyote as Nehring has suggested.

What may be feral dogs of this breed are said to be found in the Island of Juan Fernandez, off Peru. According to Ermel (1889, p. 53) they are the native Araucarian dogs, shaggy-coated, of medium size, and very powerful. Semitamed ones are sometimes used there in hunting the feral goats.

Ihering (1913) has recorded the discovery of an entire skeleton of a dog at Hualfin, Salta Province, in northwestern Argentina. Its skull measurements, as recorded by this author, correspond well with the larger of those above given, and his identification of the specimen

as an Inca Dog is probably correct.

Long-haired Inca Dog.

Characters. — Apparently similar to the Inca Dog, but with longer coat.

Distribution. — Peru and probably coastwise to parts of Chile.

Notes. — In his Bibliography of the tribes of Tierra del Fuego and adjacent territories. Cooper (1917, p. 44) mentions "a breed of long-haired shaggy dogs" which was formerly raised among some of the Chonos Indians north of the Taitao Peninsula, Chile, about Lat. 45° South. Nothing is known about these dogs except the statements of Goicueta and Del Techo, based perhaps on independent testimony. It is assumed that this breed was of native origin since at that early date (about 1553) it is rather unlikely that such dogs would have been obtained from Europeans. Possibly they were derived from the larger collie-like type of Inca dog anciently found among the Peruvians (Eaton, 1916, p. 49). From the hair of these dogs, the Chonos made short mantles that covered the shoulders and upper part of the trunk. According to Cooper, the information of Goicueta is based on the relation of Cortes Hojea's expedition of 1553-54, when he commanded one of the vessels under Ulloa, and possibly also furnished one of the sources for Del Techo's account. The latter was a Jesuit missionary who wrote in 1673 concerning the labors of his brethren among the Chonos of the Guaitecas Islands.

Referable to this breed is probably the long-haired dog described by Nehring (18S7a) from a well-preserved mummy found in the course of excavations at Ancon, Peru. It was found wrapped in cloth of

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tree-wool, its head and feet tied together. In the size of its skull and leg-bones it was said to be like the ordinary Inca Dog of the collie-like type, but clothed with unusually long hair, especially on the feet and tail. The hair is described as of a dull yellow. This dog must have been very similar to the Long-haired Pueblo Dog previously mentioned as discovered by Messrs. Guernsey and Kidder in excavations at Marsh Pass, Arizona.

Patagonian Dog.

Characters. — A medium-sized dog, as big as a large Foxhound, coat usually short and wiry, or longer and of softer texture; ears short and erect; color dark, more or less uniform, rarely spotted; dark brownish black, dark tan, or occasionally black; tail bushy. General appearance like a small Wolf.

Distrilmfion. — Found among the Foot Indians of the eastern parts of Tierra del Fuego, northward into Patagonia, the northwestward limits of distribution not clearly known.

Remarks. — Hamilton Smith (1840, p. 213) quotes a letter from Captain Fitzroy of the Beagle, that the Patagonian Dog is strong, about the size of a large Foxhound, coat short and wiry, though sometimes soft and long, like that of a Newfoundland Dog. In color it is dark, nearly uniform, rarely spotted. It is wolfish in appearance, somewhat resembles the Shepherd Dog, will growl and bark loudly.

It is doubtless a dog of this breed that is meant by Furlong in his statement that of the two types of dogs found among the Onas of Tierra del Fuego, one is like a \Wolf.

Cunningham (1871, p. 307) mentions that while near Gente Grande Bay, Sandy Point, in the Strait of Magellan, three dogs wandered about in the neighborhood of his landing party, " barking and howling dismally. The first was very much like a fox in size and general appearance, and of a reddish-gray colour; the second had a piebald smooth coat, with drooping ears; while the third was clothed with long dark brownish-black hair, had erect ears, and presented a marked resemblance to a small wolf." The first was probably a Fuegian Dog, obtained through intercourse with tribes of the western part of the Magellanic Archipelago ; the second was possibly a mongrel European dog; the last perhaps a Patagonian Dog.

Of this animal, Spegazzini (1882, p. 176) writes that it differs greatly from the Fuegian Dogs of the Canoe Indians, "y para mi serian 6

cruza 6 descendientes directos del lobo-colorado 6 gran zorro-colorado." It is difficult, however, to see any ground for deriving it from the peculiar Pampean Wolf. It is much larger than the Fuegian Dog, and is described by Spegazzini as tall, slenderly built, with fierce eyes; long-haired and bushy-tailed; the color prevailing dark tan, but occasionally black; rather silent, not barking though giving voice to melancholy howls.

Fitzroy (see Hamilton Smith, 1840, p. 215) particularly describes a dog seen near the Strait of LeMaire. No temptation would induce its master to part with it. It was the size of a large setter, with a " wolfish appearance about the head, and looked extremely savage. Behind the shoulders it was quite smooth and short-haired, but from the shoulders forward it had thick rough hair," giving it a lion-like appearance, " of a dark grey colour, lighter beneath, and white on the belly and breast; the ears were short but pointed, the tail, smooth and tapering;" the fore c^uarters very strong but the hinder appearing weaker. The short-haired tail seems unnatural for a Patagonian Dog, and may have been evidence of a strain of blood from a European source.

The eastern Fuegians or Onas, are considered by ethnologists to be derivatives of the Patagonians, and no doubt originally had these dogs from their mainland relatives, or brought them at the time when they colonized the Fuegian countr\'.

It is unfortunate that no bones or figures of the Patagonian Dog are available for comparison. Ihering (1913) has, however, recorded the skull of a prehistoric dog from Amaicha, Tucuman province, northwestern Argentina, which may represent it, and at the same time indicate nearly its northern range. This skull was 190 mm. in total (?occipitorostral) length, the upper fourth premolar 19 mm., the combined upper molars 20 mm., hence a somewhat larger breed than the Inca Dog.

The native Patagonian Dog is not to be confused with the dogs introduced by Europeans, that have since become feral on the pampas of southern South America. These, according to various writers (Rengger, 1830; Hamilton Smith, 1840; Rasse, 1879) are mongrel of several breeds, notably one like the Great Dane. They are said to go in troops and to make burrows in which to shelter their young. This burrowing habit has been noticed in case of other feral dogs. Thus Coues (1876) records the case of a brindled cur that became feral, and took up its habitation in a burrow on the open prairie, near Cheyenne, Wyoming, and in this den had a litter of five puppies.

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Fitzinger (1867, p. 397) applies to the feral Pampean Dog the Latin combination " *Canis domesiius, pyrcnaicus alco*" (!) and briefly states that it is probably a hybrid between the Pyrenian Dog and the Bull-dog. Hamilton Smith (1840) had previously described it under the

Latin name *Canis campivagus*.

As to the origin of the Patagonian Dog, there is little satisfactory evidence, but it may be assumed to be a derivative of the same stock as the Inca Dog. The tooth measurements of the skull recorded by von Ihering (1913), cf. p. 477, accord very nearly with those of the largest Inca Dog of our table (p. 473), though even larger.

Mexican Hairless Dog; Xoloitzcuintli.

Plate 2; Plate 3, %. 2.

1651. *Lupus mexicanus* Recchi and Lynceus, *Rerum medicarum Novae*

Hispaniae thesaurus, p. 479, fig.

1766. *Canis 7nexica7ius* Linne, *Syst. nat.*, ed. 12, 1, pt. 1, p. 60, (based on

Recchi and Lynceus).

1788. *Canis familiaris aegyptius* GmeUn, Linne's *Syst. nat.*, ed. 13, 1, pt. 1,

p. 68 (in part).

Canis familiaris orthoïus xoloitzcuintli Reichenbach, *Naturg. raubth.*,

p. 150.

1821. *Canis nudxis* Schinz, *Cuv. thierreichs*, 1, p. 218.

1827. *Canis familiaris caraibaeus* Lesson, *Man. mammalogie*, p. 163.

1844. *Canis caraibicus* Tschudi, *Fauna Peruana, Therologie*, p. 249.

1887. *Dysodus gibbus* Cope, *Amer. nat.*, 21, p. 1126.

Characters. — A dog of medium-size, rather heavily built, and

long-bodied in proportion to its height; ears large and erect; tail thick, drooping or carried nearly straight behind; hair nearly absent except for a few coarse vibrissae and generally a sparse coating on the tail, particularly near the tip; sometimes a tuft on the crown. The skin is usually pigmented, a slaty gray, or reddish gray, paler in the bends of the legs; sometimes blotched with white.

Distribution. — This race seems to have been native among the peoples of Central and South America from Chihuahua perhaps continuously southward, to the Peruvian lowlands, and in some of the Greater Antilles; it may also have been indigenous among the Indians of Paraguay.

History.[^] The first account of the Mexican Hairless Dog by a

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European, seems to be that of P.Vaneisco Hernandez, who lived between the years 1514 and 1578. His *Historia Antiqua et Mineralium Novae Hispaniae*, is printed on 96 folio pages as part of Recchi and Lyneus's *Reverendissimi Vedicarii Novae Hispaniae Thesaurus*, 1651, which was apparently intended as a monographic elaboration of Hernandez's work. This writer brought back an account of three sorts of dogs, which were in his day kept by the native Mexicans. The first of these he had himself seen, but the two others he had neither seen, nor known of their having been brought to Europe.

This first sort he states, is called the Xoloytzcuinili and is larger than the others, exceeding three feet in body length, but with the peculiarity of having no hairy covering, yet with a soft skin, spotted with fulvous and slate color. (" Primus Xoloytzcuintl \ocatus alios corporis vincit magnitudine, c^uae tres plerum; excedit cubitos, .sed habet peculiare nuUis pilis tegi, verum molli tantum, ac depili cuti, fuluo atque Cyaneo colore maculata."). The two other sorts of <logs were the hump-backed or Michuacan dog and the Techichi, elsewhere discussed. The XoloyizcuinUi of Hernandez is clearly the Hairless Dog, and a most elaborate account of the animal is given by Recchi and Lynceus (1651, p. 47C ft'.) with a fairly recognizable figure (Plate 2, fig. 1). These authors apparently had an actual specimen, possibly one brought alive to Europe; at all events they describe its appearance as fierce and wolf -like, with a few bristly hairs about the mouth, the mammae ten as in the wolf and dog, and the vertebrae of the same number as in a dog-skeleton with which they compared it, namely seven cervicals, thirteen dorsals, seven lumbosacrals, seventeen caudals. They name the animal *Lupus mc.vicamis* in contradistinction to their *Alco* or *Cauls ituwicana*, which was probably a Raccoon. This name appears in zoological nomenclature in the twelfth edition of Linne's *Systema naturae* under the genus *Canis*. The diagnosis, evidently based on the figure and description just noticed, reads: " *C. Cauda deflexa lae\i, corpore cinereo fasciis fuscis maculisque fulvis variegata*"; the habitat is given as the warmer parts of Mexico. Linne's first reference is to Brisson, whose description — " *Canis cinereus, maculis fulvis variegatus*" — is clearly from the same source. Hitherto Linne's *Canis vw.vicanus* has been regarded as applying to the wolf of Southern ^Mexico, }>ut no true wolf is known

from that part of the country. Miller (1912a) seems to have been the first to question the propriety of using the name for a wolf, but leaves the matter unsettled, saying that according to E. W. Nelson, "the wolf of the southern end of the Mexican tableland became extinct

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about fifty years ago" (1860). Some other name must therefore be applied to this wolf if it ever be shown to be distinct.

The above accounts by Hernandez and by Recchi and Lynceus are the basis of most of the earlier references to the Mexican Hairless Dog. Lesson, in 1827, however, redescribed it under the name *carabacus*, and Gmelin, earlier, 1788, had considered it the same as the Turkish or Egyptian Hairless Dog, under the name *Canis f. acnapius*: this however, is a hairless variety of another breed.

Noics. — The former distribution of this remarkable dog is now hardly traceable with certainty except in a general way, but it was kept by the Mexicans of Chihuahua and southward, as well as by the natives of Peru, more especially those of the lower altitudes. According to Seler (1890) the Mexicans wrapped these dogs in cloths at night as a protection against cold. Some were not naturally hairless, but were rubbed with turpentine from early youth, causing the hair to fall out. On the other hand, dogs naturally hairless were raised, as at the pueblos Teotlixco and Tocilan. The Zapotec and

Many languages have separate words for the hairless dog. The term *otloifzcuhili* is said to signify the monstrous dog. Patrick Browne (1789, p. 45.) writing of the natural history of Jamaica, mentions the Indian dog as "*Canis pilis carens, minor*," a creature "frequent among the Jews and natives in that island; he describes it as "generally about the size of a cur-dog with a rough skin, which looks like the hide of a hog." There is nothing to indicate, however, that the breed was common in the West Indies.

In Peru, Tschudi (1844, p. 249) observed this dog mainly on the coast, since its lack of a hairy coat made it unable to withstand the cold of the higher altitudes of the interior except in the warm valleys, and then only if carefully protected. He describes it as slaty gray or reddish gray, sometimes spotted, and says it is voiceless. He is probably mistaken, however, in supposing these were the dogs found by Columbus among the Lucayans. Nearly twenty years previously, Lesson had seen the Hairless Dog in numbers at Payta, Peru.

According to Rengger (1830), a hairless dog, possibly identical with the Mexican Hairless Dog, was indigenous among the Indians of Paraguay, who had a special word — *yagua* — for it. He describes it as having a relatively small head, pointed snout, ears erect or only their tips drooping forward, rump fat, extremities fine, tail spindle-shaped and usually drooping. Some individuals do not bark, but howl only.

During the last hundred years, little attention seems to have been

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given to this breed, although lately it has been taken up by dog fanciers. LeConte, in 1856, calls it the Comanche Dog, and says it is common among the Indians of that tribe, but, "though some of these dogs have been brought within the United States, we have no description of them." Packard (1885) mentions seeing one in his visit to Mexico, but they were apparently uncommon. In a recent letter from Mr. Arthur Stockdale, he states that in Mexico (where they are now considered somewhat of a rarity, though said to be common in Chihuahua, where however, little attention is paid them.

There is some evidence that they do not breed readily with normally haired dogs, yet such crosses have been made, and curiously the result seems to be that about 50% of the young are naked or practically so, the other 50% fully haired. Stockdale (1917) records such a litter consisting of two puppies, one hairless, the other normal. Kohn (1911) records a mating of a Hairless Dog with a Fox-terrier, the four offspring of which comprised two naked and two completely-haired dogs. His microscopic study of the skin of the Hairless Dog indicates that its character is that of a young embryo's, whence it may be that the hairless character is merely the retention of the embryonic condition, just as the short-nosed skull of the Japanese Lap-dog seems to be a case of the retention of the embryonic proportions of the skull.

As to the origin of this breed, it is most likely a variant of the larger

type of Indian Dog, in which the hairlessness is due to a retention of the embryonic condition of the skin, precluding hair development, just as the short-nosed breeds of dogs are the result of the failure of the facial bones to attain full growth.

I have unfortunately been unable to obtain skulls for comparison.

Small Indian Dog or Techichi.

Plate 10.

1788. *Canis familiaris americanus* Gmelin, Linné's Syst. nat., ed. 13, 1,

pt. 1, p. 66 (in part).

1792. *Canis americanus plancus* Kerr, Animal kingdom, 1, p. 136 (based on

the Techichi of Hernandez).

1840. *Canis alco* Hamilton Smith, Jardine's Nat. library. Mammalia, 10,

p. 135, pi. 4, left-hand fig.

1841. ? *Canis familiaris cayemietensis* Blainville, Osteographie. Atlas, 7^e.

1867. *Canis caribaeus, hernandesii* Fitzinger, Sitzb. K. akad. wiss., Wien,

56, pt. 1, p. 498.

1882. *Canis fibbus* Duges, La naturaleza, 5, p. 14, fig. 1-3. ,,,.

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Characters. — X small, light-limbed dog, of rather slender proportions, narrow delicate head, fine muzzle, erect ears, well-developed tail, which may have been close-haired. Colors black, black and white, or perhaps brownish or yellowish.

Distribution. — This was perhaps the dog of fox-like appearance noticed by many of the early explorers, yet it is difficult to indicate the limits of its former distribution. On the Atlantic seaboard, among the considerable quantity of skeletal remains examined, I have seen nothing that could be referred to such a dog; yet Brereton, who reached the Elizabeth Islands and coast of southern New England with Gosnold in 1002, mentions "Dogs like Foxes, blacke and sharpe nosed" among the "Commodities" seen there. In the famous village site near Madisonville, southwestern Ohio, its bones occur and there are in the Peabody Museum similar bones from the southwest and Yucatan, believed equally to be pre-Columbian. Among the dog-skulls found with Peruvian burials the same type occurs, as well as skulls intermediate between this and other dogs, and so probably representing mongrel individuals. Probably then this type of dog was spread over at least the central and southwestern part of North America and parts of northwestern South America.

Nomenclature. — This is assumed to be the Techichi of the early Spanish accounts of Mexican dogs, though there is little doubt that two different animals as well as more than one breed of dog were confused under this title by the early writers and systematists. It is of

some importance, therefore, to examine their accounts carefully since the case is somewhat complex and involves the identity of the Alco of early writers. Both Gmelin and Kerr based their names on the account of Recchi and Lynceus (1651, p. 46G), who in turn refer to Hernandez's brief account (which they print), in the *Historiae animalium et mineralium Novae Hispaniae*, page 7. Hernandez who died in 1578, had visited Mexico, and in his enumeration of its animals includes three sorts of native dogs. The first of these is unquestionably the Mexican Hairless Dog, and as he himself states, was the only one he saw personally ("caeteros vero neque conspexeram, neque adhuc eo[z. c. ad Europam] delatos puto").

His account of the two other dogs is important and reads: —

" Secundus Melitensibus canibus similis est, candido, nigro, ac fuluo colore varius, sed giberosus, gratusque iucunda quadam deformitate, ac capite velut ab humeris edito, quem Michuacanensein abora vnde est oriundus vocare solent. Tertius vero nuncupatus Techichi, Catulis similis est nostratibus, Indis edulis, tristi aspectu, ac caetera

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vulgaribus similis. Atque haec de canibus Nouae Hispaniae breuiter dicta sunt." Translated freely, "The second is like the Maltese dogs, in color varied with white, black, and fulvous, but it is hump-backed and prized for this pleasing deformity, and a head that appears to grow from the shoulders. It is called the Michuacan flog from

the place where it is native. The third sort of dog, however, is called Techichi, and is like our Spaniels, but of sad countenance, though in other respects like ordinary dogs. It is eaten by the Indians. This then is briefly what I have to say of the dogs of Mexico." The Techichi apparently was in no wise peculiar as a small dog. The Michuacan animal, however, was hump-backed, without conspicuous neck, its colors white, black, and fulvous, 'Sarins.'" In their elaboration of Hernandez's account, Recchi and Lynceus (1651, p. 466) fail to distinguish between these two supposed dogs; at all events their figure (Plate 3, fig. 1) and description deal altogether with the hump-backed animal, of which they seem to have had some knowledge or probably a preserved specimen. They figure a female under the name 'Canis Mexicana' and the Mexican name Ytzcuintcporzotli, the first half of which signifies 'dog.' Buffon, and later Gmelin, likewise failed to distinguish between Hernandez's second and third sorts of dogs, and the latter author in 1788, combined the two under the name *Avicricanus*, with a brief diagnosis based on the figure of Recchi and Lynceus, viz., "magnitudine t [i. c. of the breed *inelitaeus*], capite parvo, auribus pendulis, dorso curvato, cauda brevi." Under this name, Gmelin included: a. Ytzcuintcporzotli, or the *Canis mexicana* of Recchi and Lynceus and b. Techichi of Hernandez. Obviously the diagnosis applies to the hump-backed animal only, to which Buffon had already applied the native name *Alco*, following Recchi and Lynceus. This name appears to have been of doubtful application to the common dog, but was used at times by later writers to indicate the small native dog of Peru and Mexico. Kerr (1792, p. 136) endeavors to improve on Gmelin by distinguishing with Latin names the two varieties of the latter's *Canis amricamis*. He first transcribes the description and then distinguishes: "a. Fat *Alco*. —

Canis aniericanus obesus" and "b. Techichi. — *Canis americanus planeus*," with descriptive accounts from Hernandez and his elaborators, corresponding to Gmelin's "a" and "b."

What then was this Alco? A study of Recchi and Lynceus's figure (Plate 3, fig. 1) and description seem to indicate clearly that they had in mind a Raccoon. They describe its nose, forehead, and eye-brows as white, these markings evidently delimiting the dark face,

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while the peculiar and characteristic upward slope of the back in the live animal is thus described: "Dorsum cameli instar gibbosum, post coUuni subito ad pectus accliuue, sed coxas versus decline." The tail is said to be short, barely reaching the heel, the mammae six in number. They further note its very fat belly, beautifully covered with thick black hair Aaried with spots; feet and shanks whitish, claws strongly exerted. These characteristics recall the Raccoon more than an\ other animal. There are, however, eight mammae in this animal, and the ears are not pendulous as described, biit these discrepancies may be due to inaccuracy of observation, or the condition of the specimen (perhaps a preserved hide) which the authors seem to have had. The account quoted from Acosta (1590, p. 277) doubtless refers to the same animal and not to a dog. This author, in his *Historia natural y moral de las Indias*, writes: — " Verdaderos perros no los aula en Indios, sino unos semejantes a perrillos, que los Indios

llamauan Alco: y por su semejana a los cjue ha sido lleuados de
Espaia. tambien los Uaman Alco: y son tan amigos destos perrillos
que se quitaran el comer, por darselo : y quando van camino, los lleuan
consigo acuestas, o en el seno." (Of real dogs there are none' in the
Indies, save certain animals resembling little dogs, which the Indians
call Alco; and on account of their resemblance to our dogs brought
here from Spain, the Indians call these Alco as well: and so fond are
they of their little dogs that they deiij^ themselves of food in order to
give it to them; and when they go on a journey they carry the little
dogs with them on their shoulders or in their arms). The Raccoon
rather than a small dog seems to be indicated here, and the habit of
carrying them about on journeys would perhaps accoimt for the
present-day anomalous distribution of the small species of raccoon in
Central America (Panama) and in the islands of Cozumel, Guade-
loupe and New Pro^idence. Acosta's story may also explain the
transference of the name Alco to small dogs, though Philippi (1886)
says this means dog in the Quichua tongue.

An early mention of the tame Raccoon is found in Hakluyt's Voy-
ages, in A relation of the commodities of Nova Hispania, and the
maners of the inhabitants, written by Henry Hawkes merchant,
which lived five yeeres in the sayd countrey, written in 1572. He
says: "Their dogs are all crooked backt, as many as are of the coun-
trei breed, and cannot run fast: their faces are like the face of a pig
or a hog, with sharpe noses."

If Gmelin's name *amricamis* be admitted as applying to a Raccoon
it would antedate ^Yagler's name *hernandezii* (1831) for a Mexican

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Raccoon. In view, however, of the uncertainty as to which form of Raccoon it should indicate, there seems to be no virtue in making such a change at present.

Later writers have tried to discover living examples of the original Alico with small success. Hamilton Smith (1840, p. 13.5, pi. 4, left-hand fig.) describes as *Canis alco*, what he supposed to represent this breed, from a stuffed specimen in an exhibition of Mexican curiosities made by W. Bullock, and said then to be in the Egyptian Hall (British Museum). He says of it: "That enterprising traveller described it as of the wild race; yet, from its appearance, we at first considered it to be a Newfoundland puppy." The figure shows a small black and white dog with rather full-haired tail, clumsy build, and ears laid back. Of the mounted specimen, Hamilton Smith further writes: —

" It was small, with rather a large head; elongated occiput; full muzzle; pendulous ears; having long soft hair on the body. In colour, it was entirely white, excepting a large black spot covering each ear, and part of the forehead and cheek, with a fulvous mark above each eye, and another black spot on the rump; the tail was rather long, well fringed, and white." This description, except for the pendulous ears might apply well enough to the type of small dog here treated. How much of its appearance was due to the taxidermist's efforts is, however, to be considered. It is even possible that it was after all only a

spaniel, which, except for its short ears, it seems to resemble.

What seems to have been a slightly deformed Indian Dog, is described and figured by Duges (1882) as a Chihuahua Dog (a ten that is used by fanciers for a dwarf breed, with erect ears). From his figure of the skull, it is evident that the animal was young. It was apparently rather small, had but three lower premolars (the first lacking), a rather heavy head, and long close-haired tail. The back seems to have been unduly arched but the head is represented as erect, and the posture quite different from that of a raccoon. The color was blotched black and white. The ears were cropped, but were assumed to have been erect. So far as can be judged from Duges's account, this may have been a dog similar to the Techichi. He, however, supposed it to represent the xolo.

The confusion of names has been added to by Cope (1887) who examined three skulls of the so called Chihuahua Dog. He found a variable reduction in the number of teeth, correlated apparently with the loss of hair. The premolars were reduced to 3 or 4, while the molars were 3, 4, and 3 respectively. In all, the inner cusp of the lower sectorial was lacking. On account of the reduced number of

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molars, and this character of the sectorial, Cope refers this breed to his genus *Dysodus* (Cope, 1879, 1879a) based on the Japanese Lap-

dog, adding that " the species may be called *Dysodus gibbus*," for " the Chihuahua dog is the *Canis gibbus* of Hernandez." The animal to which Hernandez applied the adjective " (*jibcrostis*," however, was with little doubt a Raccoon.

Skeletal Remains. — Among a great number of bones of Indian dogs examined, from mounds, burials, or refuse deposits in various parts of America, there occur skulls or fragments of jaws appertaining to a wholly different type of dog from the large varieties just described. The remains indicate a small light-limbed animal, with slender muzzle abruptly narrowed in front of the third premolar. Although the surface of the brain-case in adults is roughened for muscular attachment the sagittal crest does not develop till old age. All the teeth are small (upper caninasi 14-16.5 mm. in length), the nasals long, and the skull normal, in that it seems not shortened or broadened in any way, the teeth not crowded. A transverse line at the end of the palate falls about through the middle of the second molar. These dogs are probably the third variety of Hernandez, the Techichi or Small Indian Dog. Several skulls, more or less imperfect, from the Madisonville, Ohio, village site are referred to this breed, though their measurements are a very little larger than those of more southern specimens. They occur here together with bones of the large type of Indian Dog. An imperfect cranium (M. C. Z. 7,123) collected many years ago in McPherson's Cave, Virginia, by Lucien Carr, is apparently in every respect similar to a skull of this type from Pecos, N. M., obtained by Dr. A. V. Kidder in the course of excavating a village site. A similar but slightly smaller, though adult, skull from Pueblo excavations in the southwest is practically the same, as is also a skull of the Papago Indian Dog obtained by the late Dr. Edgar A. Mearns

at Sonoyta, Sonora, while on the Mexican Boundary Survey. It is not fully adult, though of nearly mature dimensions. What seems to be a dog of this type is represented in the Peabody Museum by a cranium and hind leg-bones from Labna, Yucatan; the rostrum is damaged and the teeth lost except the carnassial. The long slender limb-bones are in strong contrast with the short thick bones of the Short-nosed Indian Dog.

Turning now to South America, the Museum has a cranium from Surinam, labeled: — Carib Indian Dog. It was received through the Boston Society of Natural History from the Wyman Collection, and was probably collected by Dr. F. W. Cragin, some fifty years ago

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Though it has acquired the adult dentition, it is not old, and the temporal ridges have not yet united to form a crest. A very similar skull from French Guiana is figured by Blainville (1841) under the name *Canis familiaris cayennensis*, by which he seems to have intended to name the native dog.

I am indebted to Dr. W. C. Farrabee for a photograph, (Plate 5, fig. 2) which is assumed to illustrate this dog. It was secured by him while studying the Macusi tribe in southern British Guiana, and shows an old dog, and a puppy, accompanying a child of the tribe. The larger dog has a narrow head, and erect ears, the tips of which

have been cropped, probably as a propitiation to evil spirits; the body is short in proportion to the lean limbs, the tail (better seen in the picture of the puppy) is long, upcurving, and like the body, short-haired. Dr. Farrabee writes that these dogs "are small, yellow and white, or brindle and white, and may be very much mixed with European dogs." Of their ancestry, however, there is no evidence, though the erect ears and slender proportions favor the supposition that they retain a measure of their aboriginal character. The expression of the larger dog recalls the "tristi aspectu" of Hernandez's description of the Techichi. It is not unlikely that the small dogs found by the Jesuits among the Indians of the southern Antilles and parts of Colombia and Central America may have been of the breed here described.

Dr. Farrabee writes me further concerning some larger dogs which he saw among the Wanoai tribe "who occupy the Akarai Mountains, northern Brazil to southern British Guiana. This tribe, on the Brazil side had never seen white men before [his visit]. They have the best dogs of all the tribes visited and they take the best care of them. These dogs are noted among the tribes a month's journey away. They keep the dogs tied on raised platforms and allow them to exercise morning and evening. The dogs are all black and white and of good size." A small photograph of these dogs shows a hound-like aspect and drooping ears. They are probably of European origin and perhaps the same as the dogs mentioned by Bancroft (1769, p. 140) who says: "The Dogs of Guiana seem to be of a species between the Hound and Land-Spaniel: their make is slender, their ears long and pendulous, with a blunt nose, and large mouth: their bodies

are covered with long shaggy hair, generally of a fallow colour. They pursue and start the Game by the scent."

I am indebted to J. Rodway, Esq., of the Museum at Georgetown, British Guiana, for a brief note on the hunting-dog of the present-day

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Indians of that country. He considers that it is of undoubted European origin, "has no particular characters," and "could be matched in any lot of mongrels. It is generally rather small with a pointed muzzle, foxy looking, and kept hungry to prevent laziness." The "foxy" appearance is somewhat typical of the native breeds of smaller Indian dogs, a result of the fine muzzle, ample erect ears, and drooping tail, traits which seem still traceable among these mongrels of the modern Guiana Indians.

Among a series of dog-skulls (belonging to the U. S. N. M.) from ancient burials in Peru are two which in their small size and slender proportions seem referable to the Techichi. Both are fully adult, with a well-developed sagittal crest on the interparietal, extending forward in the larger skull on to the parietal suture. As will be seen from the table of measurements appended these skulls are a very little larger, with slightly shorter nasals, as compared with the other skulls whose dimensions are given. It is possible that this is due to some admixture with the short-nosed breeds. Nevertheless the skulls

in question are quite different from the latter in their slender and narrow outlines, and unshortened tooth-row.

No doubt, if we knew the external characters of the dogs whose skulls are here listed, it would be possible to recognize more than one breed. Thus the Ohio individuals are a trifle larger in dimensions than those of the Southwest and the Peruvian dogs again are a little larger. Yet all are clearly of the same general type.

A comparison of the skulls and measurements of these specimens with those of the *Canis palustris* of Riitimeyer from the Swiss Lake-Dwellings of late Neolithic to Bronze times in Europe, reveals a rather close correspondence which is probably more than accidental, and may even indicate a derivation from some common Asiatic stock at a very early period. The type of small dog of the Swiss Lake-Dwellings was one apparently of general distribution in southern Europe during the Neolithic time, and Aulrich (1886a) has identified it as far north as Denmark in the kitchen-middens. It was apparently, on the average, of wider zygomatic breadth, but otherwise its dimensions corresponded very closely. This evidence favors the view that a dog of this type was one of the earliest to be domesticated and was of wide distribution in an early period of human culture. Remains of a larger type of dog, *C. intermedius*, are also wide-spread in late Neolithic or Bronze culture layers of middle Europe, and correspond broadly to the larger type of Indian dog, a parallelism that is suggestive of the common origin of the large and the small types of dogs in Europe and America, probably from Asiatic prototypes.

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Early Accounts. — Hernandez disposes of the Techichi in few words, as being the third sort of dog he knew to be found in Mexico. It must have become scarce by his time (about 1578) as he had not seen it himself but describes it thus: — "Catulis similibus est nostratibus, Indis eduhis, tristi aspectu, ac caetera vulgaribus similibus" (similar to our spaniels, eaten by the Indians, of melancholic visage, but otherwise like the common dogs). J. Jonstonus, writing in 1657, includes in his account of dogs, a transcription of Hernandez's passage as to

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the three sorts of dogs in Mexico. He adds further that the Indians of Cozumel Island ate these dogs as the Spaniards do rabbits. Those intended for this purpose were castrated in order to fatten them.

Clavigero, the historian of early Mexico, wrote that the breed was extinct in his time, due, as he supposes, to the Spaniards' having provided their markets with them in lieu of sheep and cattle.

Possibly this breed of dog is the one mentioned in De Soto's relation

of his march through Florida. At one place the cacique of the village sent him a present including "many conies and partridges. . . many dogs which were as much esteemed as though they had been fat sheep." At another place, "the Christians being seen to go after dogs, for their flesh, which the Indians do not eat, they gave them three hundred of these animals." Again, at a small Indian village called Etocali, the expedition got "maize, beans, and little dogs, which were no small relief to the people."

As late as 1805, Barton (1805, p. 12) who had made special inquiry of William Bartram, as to the dogs of the Florida Indians, quotes him, that the latter had in addition to the larger dogs, a smaller breed, about the size of a fox, which probably was of the type under discussion.

It is probably this dog, if not also the short-nosed Aariety, that figures largely in the mythology of the Mayas of Yucatan. Among several representations of the dog in the Mayan codices are seen short-nosed and long-nosed heads, but whether these really indicate different breeds of dogs or different artists that made them cannot be determined. All are shown with erect, sometimes with cropped ears, a tail that is of medium length, usually shaggy, and recurved. Black patches are commonly represented on the body, and the eye of the dog often centers in a black area. Seler (1890) speaks of its use as a sacrificial animal in Yucatan, sometimes in place of a human being. Placed in the grave, the dog carried its master's soul across the "Chicunauhapan" or nine-fold flowing stream. According to Sahagun, some were black and white, others dark red, and there were short-

haired and long-haired dogs, but he does not state whether the small and the large types of dogs each had short-haired and long-haired varieties. A brief summary of the significance of the dog in the religious life of the Nl'ayay is given by Tozzer and Allen (1910, p. 359).

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Hare-Indian Dog.

Plate 1, fig. 2.

i 1829. *Canis lagopus* Richardson, *Fauna Boreali-Amer.*, 1, p. 78, pi. 5 (not

Canis lagopus Linne, 1758, q. e. *Alopex*).

1867. *Canis domesticus*, *lagopus* Fitzinger, *Sitzb K. akad. wiss. Wien*, 56, pt. 1,

p. 407.

Canis faviiliar is orthotus lagopus Reichenhach, *Regn. anim.*, pt. 1, p. 13.

Characters. — A small, slender dog, with erect ears and bushy tail, feet broad and well-haired. Color white with dark patches.

Distribution. — Formerly found among the Hare Indians and other tribes that frequented the borders of Great Bear Lake and the banks of the Mackenzie River.

Description. — This seems to have been a small dog, of the Techichi type. Richardson, who gave a figure and description of it from first-

hand acquaintance, characterizes it as slightly larger than a fox but smaller than a coyote, and apparently of rather slender proportions. The head was small with sharp muzzle, erect thickish ears, somewhat oblique eyes; the tail bushy and sometimes carried curled forward over the right hip, though this does not appear in Richardson's figure; foot broad and well-haired. He describes an individual as having the face, muzzle, belly, and legs white; a dark patch over the eye, and on the back and sides, larger patches of dark blackish gray or lead color, mixed with fawn and white. Ears white in front, the backs yellowish gray or fawn; tail white beneath and at the tip.

Notes. — It seems probable that this small breed was lost in the early part of the last century. At all events, writers subsequent to Richardson do not seem to have met with it, and those that mention it, seem to have confused it with the Common Indian Dog. Thus B. R. Ross (1861) and Macfarlane (1905, p. 700) clearly had in mind a different animal; and a skull sent by the latter to the U. S. N. M. as lagopus (from Fort Simpson, Mackenzie River) is a large dog, evidently the Common or Larger Indian Dog. Hamilton Smitli (1840, p. 131) takes his description in part from Richardson, and mentions a pair of these dogs as then living in the Zoological Society's Gardens at London. Audubon and Bachman likewise are indebted to Richardson for their account, though their figure, by J. W. Audubon, is said to be from a stuffed specimen, perhaps one of those previ -

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ously living in the Zoological Society's Gardens. The dimensions they give however, seem rather large.

Richardson says further that it was used solely in the chase and was probably too small to serve as a burden carrier. Its voice was a wolf-like howl, but at some unusual sight it would make a singular attempt at barking, commencing with a peculiar growl and ending in a prolonged howl.

Here may be mentioned what seems to be an unknown or vanished breed of dogs as indicated in the account of Frobisher's Voyage to Arctic America in 1577. At the present Frobisher Bay, in south-eastern Baffin Land, the expedition found in addition to the large dogs used for sledging, a smaller breed, which was apparently used only as food, and allowed the freedom of the skin tents of the Eskimos. The historian of the expedition writes that they "found since by experience, that the lesser sort of dogges they feede fatte, and keepe them as domesticall cattell in their tents for their eating, and the greater sort serve for the use of drawing their sleds." At York Sound, the same writer relates that on going ashore to examine "certaine tents of the countrey people," they "found the people departed, as it should seeme, for feare of their coming. But amongst sundry strange things which in these tents they found, there was rawe and new killed flesh of unknowen sorts, with dead carcasses and bones of dogs" (Hakluyt's Voyages, Everyman's Library, ed. 5, p. 212, 215). Concerning this "lesser sort of dogges," nothing further seems to be known, whether they were a dwarf variety of the Eskimo dog, or as seems likely, a small breed similar to those of the Hare Indians or of other

tribes of the mainland.

FuEGIAN Dog.

Plate 4, fig. 2.

Characters. — Size small, as large as a terrier, muzzle slender, ears large, delicate, and erect, body and limbs well-proportioned, shoulders higher than rump; tail long, drooping, slightly recurved at the tip and well-fringed; feet webbed; color uniform grayish tan, or often with patches of black or tan, and areas of white; inside of the mouth dark-pigmented.

Distribution. — Found chiefly among the "Canoe Indians" — Yahgans and Alacalufs — of the Fuegian Archipelago, from Cape Horn to Beagle Channel, and northwestward, probably at least to the western part of Magellan Strait.

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Descriptions. — The best account of the Fuegian Dog is that given by d'Herculais (1884) of two Yahgan Dogs brought back to France by Dr. Hyades of the Mission scientifique au Cap Horn (expedition de la Romanche), in 1883. These were obtained as puppies from the Yahgans at Orange Bay and grew up to be tame and affectionate dogs. They are described as small but well-proportioned, remarkable for their large pointed and erect ears, and very sharp slender muzzles.

The color-pattern is very variable, often a uniform grayish tan recalling the jackal; again, the body is marbled with extensive black or tan areas on a white ground. The feet are plainly webbed. The two dogs above referred to, were said to measure, the male and female respectively: — height at shoulder, 49 and 44 cm.; length from tip of nose to root of tail, 80 and 72 cm. ; length of tail, 26 and 23 cm.

External Measurements. — Dechambre (1891) in a note on these same dogs, gives the following dimensions, evidently of a female: —

Scapuloischial length 52 cm.

Height at shoulder 41 "

Height at rump 39 "

Height at axilla 25 "

Thoracic perimeter 58 "

Distance between ears 9 "

" " inner corners of eyes 4.5 "

outer " " " 8.5 "

Breadth of forehead 11 "

Length of head 22 "

" " muzzle 9 "

Interorbital width at outer corner of eye 9.5 "

The further description by Dechambre supplements that of d'Her-
culais based on the same individual. He describes its fox-like head
with pointed muzzle, broad forehead, its erect and high-set ears,
usually directed forward, very mobile; eyes slightly oblique. The
body is large, limbs slender, the neck short and powerful, the
shoulders slightly higher than the rump; tail bushy and carried
high. Pelage with a short under fur, pied black and white, passing
to slaty at the throat, clouded with tan ; over each eyebrow a white
spot with a few fulvous hairs. The coat has the appearance of a
domesticated animal in its pattern.

Captain Fitzroy of the Beagle, in a letter to Hamilton Smith (1840,
p. 214) describes these dogs of the 'Canoe Indians' as resembling
" terriers, or rather a mixture of fox, shepherd's dog, and terrier. All

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that I examined had black roofs to their mouths, but there was much
variety in the colours and degrees of coarseness of their coats. * * *

Many Fuegian dogs are spotted and not a few have fine short hair,

but all resemble a fox about the head. * * * One brought from Tierra del Fuego Mas white with one black spot, and very handsome; his size was about that of a terrier, his coat short but fine, and his ears extremely delicate and long, although erect;" the muzzle also is long, the tail rough and drooping.

Skull and Limb-botics. — In a recent paper. Professor Lonnberg (1919) has given what appear to be the first published figures and measurements of the limb-bones and skull of this dog. His specimen was a skeleton obtained by Xordenskjold in 1895-96 during his Tierra del Fuego expedition. As this author demonstrates, the skull is that of a true dog, and shows no relationship with the native canid, *Psittaculoxys lycoideus*. A comparison of the cranial measurements with those given for the Techichi of North and South America, shows a very close approximation, amounting almost to identity. The first lower molar in the Fuegian Dog seems smaller, however, 16.5 mm. in Lonnberg's specimen against 17.5 to 18.5 mm. in the more northern dogs. For better comparison, the following measurements of the Fuegian Dog are reproduced from this paper (Lonnberg, 1919, p. 11):-

Condyle-incisive length 141 mm.

Length of palate 71 . 3 "

Front of canine to back of m- 64 "

Length of premolar* 15. 2 "

Length of upper premolar-molar series.51 "

Width of palate outside m[^] 52 . 6 "

Zygomatic width 81 "

Length of nasals mesially 46 "

Length of lower mi 16. 5 "

Length of humerus 105 "

Length of ulna 125

Length of femur 132

Length of tibia 139

I.scs. — The Fuegian Dog is active and strong in proportion to its small size; quiet, faithful to its master, and able to withstand much privation; A-gilant and extremely sly. It is capable of barking like the European dogs.

They are of invaluable service to their masters in hunting, particularly in the pursuit of otters (*Lutra fclina*), which are assiduously

sought. Indeed Fitzroy wrote that " it is well ascertained that the oldest women of the tribe are sacrificed to the cannibal appetites of their countrymen rather than destroy a single dog. ' Dogs,' say they 'catch otters; old women are good for nothing.'" They are vigilant watch-dogs, liarking furiously at a stranger. Their small size, and consequent adaptability as canoe companions, are no doubt the chief cause for their preference by the Canoe Indians of the west Patagonian Archipelago, over the larger dogs found among the so-called Foot Indians of the mainland and the eastern and inland parts of Tierra del Fuego.

Remarks. — In the absence of specimens for comparison, it is not altogether clear that the Fuegian Dog can be satisfactorily distinguished except in minor particulars from the Techichi or Alco of Peru and Alexico. ^Molina apparently thought it identical. In general it appears closely similar, but perhaps of more slender build, a bushier tail with recurved tip, well-palmated feet and a shaggier coat, though Fitzroy speaks of variation in this last character.

In his Bibliography of the Fuegian tribes, Cooper (1917, p. 186) has summarized the references to dogs in the literature referring to these people. As early as 1557, or perhaps 1553, the Chonos at the northern end of the Chilean Archipelago, were credited with having dogs, as appears from Goicueta on the authority of Cortes Hojea. The first mention of dogs in the Strait of Magellan appears^ to be that of Narbrough, who in 1670, found the natives of the Elizabeth

Islands in possession of large mongrel dogs of several colors. He compared them to the race of Spanish dogs he had found among the Patagonians of Port Julian. Probably these were not of native stock. Twenty-six years later de Gennes saw five or six small dogs among the Alacalufs of Port Famine. The Manekenkn met by the first Cook expedition in 1769 at Good Success Bay, southeast end of Tierra del Fuego, had dogs about two feet high with sharp ears; they all barked. The small dog here described is apparently found among the so-called Canoe Indians of the western archipelago, the Yahgans and Alacalufs, the most southerly tribes of men in the world.

SUOKT-NOSED INDIAN DOG.

Plates 6, 11.

1885. *Pachycyon robustus* J. A. Allen, Mem. M. C. Z., 10, 13 pp., 'S pis.

1885. *Canis ingae variagatus* Nehring, Sitzb. Gesellsch. naturf. Freunde B(U-lili, p. 5-13 {not *Canis familiaris* variegatus, Syst. nat., 12th ed., 1766, 1, p. 57.

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Characters. — A stoutly built dog, the size of a small terrier, with erect ears, short heavy muzzle, high forehead, short body and limbs, well-developed tail.

The color seems to have been black and white; sometimes more uniformly black, or yellowish with dark blotches.

The skeleton is stoutly proportioned, the limb-bones short and thick, the humerus with a very small or no olecranal perforation.

The sagittal crest is chiefly developed at the occiput. Correlated with the slight reduction of the maxillary bones, and the widening of the palate, is the fact that the last molar is placed just in advance of a transverse line through the posterior boundary of the palate.

Distribution. — Skeletal remains of this peculiar small dog have been found in Virginia in a superficial cave-deposit, as well as in the shell-mounds of San Nicolas Island on the coast of southern California.

A well-preserved dried or mummified example was lately discovered by Mr. S. J. Guernsey in a burial antedating the Cliff Dwellers, in the Marsh Pass region of Arizona; and Reiss and Stiibel have discovered its mummified remains in the prehistoric necropolis of Ancon, Peru (see Nehring, 1884b). In the M. C. Z. is a humerus lacking the epiphyses, of a young specimen from Pecos, New Mexico, obtained by Dr. A. V. Kidder. These localities may be taken as limiting the known extent of its distribution.

Notes. — In 1885, Dr. J. A. Allen described as a new genus and species *Pachycyon rohustus*, an extinct type of dog from Ely Cave, Lee County, Virginia, basing his account upon a pelvis, a femur, a tibia, a scapula, and a humerus of which he publishes excellent illustrations. These bones were obtained in the course of excavating the superficial layer of earth on the cave-floor, and though it is not certain

exactly at what point they were found, no excavations deeper than a foot were made. Remains of Indian occupation were numerous, and other bones were obtained in the cave. There is nothing to indicate great age in the type-specimens fM. C. Z. 7,091); indeed the bones are quite fresh in appearance, only slightly discolored with earth. They are chiefly notable for their small size and rather heavy ungraceful proportions, while the humerus is particularly marked on account of its lacking the usual perforation over the middle of the epicondyle. This perforation is almost always present in Eurasian dogs, as well as in coyotes and wolves. No further light has since been shed on the nature of this animal nor have any parts of its skull been found.

Among the remarkable discoveries made by Mr. S. J. Guernsey in the course of archaeological exploration in the Marsh Pass region of

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Arizona for the Peabody Museum, were the dessicated remains of two dogs with human burials of an age apparently antedating the culture of the Cliff Dwellers. One of these dogs is small, about the size of a Fox-terrier but more compactly and heaxily built, with a shorter head, erect ears, and longer tail. It still shows a black and white pattern, with a narrow median white line from nose to forehead, a white chin, throat, and lielly, a white collar, white feet, and tail tip. Much of the body is black. In the length of the limb-bones and pelvis as nearly as can be determined from careful study of the

dried and mummified specimen, it corresponds exactly with Pachycyon. By making incisions through the dried tissue at the elbow, it was possible to lay bare the olecranal cavity above the joint where the large perforation is usually present. It was found that in the right humerus a small perforation was present, about 3 mm. in diameter, while in the left humerus there were merely two small pores side by side. The animal was young, still retaining a milk incisor, and so it is likely that had it been as old an individual as the one whence the type-bones of Pachycyon were derived, these foramina would have ossified completely, perhaps leaving, as in the type-humerus, a shallow pit in the posterior side of the olecranal fossa, as an indication of the former perforation. So complete is the correspondence of the bones of Pachycyon with those of this prehistoric dog of Arizona that they may be unhesitatingly pronounced those of a similar if not identical breed of Indian dog.

Not less interesting is a comparison of the humerus of Pachycyon with a humerus figured by Nehring (1884b, Plate 118, fig. 4, 4a) from a mummified dog exhumed with human-mummies in the ancient necropolis of Ancon, Peru. In measurements, there is practical identity as shown in the following table (the measurements of the Ancon humerus are taken directly from Nehring's figure, of natural size) : —

Pachycyon Ancon

Greatest length of humerus 97 mm. 97 mm.

Greatest diameter through head of humerus 31 . 5 29 . 5

Transverse " " " " " 21 24

Transverse diameter 6i distal end of same 25 25

Nehring's figure shows substantially the same type of thick stout humerus, and as he remarks, has the further peculiarity of lacking any trace of perforation of the olecranon fossa. It should be added that the humerus, shown in his figure is nevertheless very slightly

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more bowed than that of the type of *Pachycyon*, and in his opinion the Peruvian Dog corresponded closely to a European Turnspit or Dachshund, whence he calls it *Canis ingae vertagus*. The figures of the skull of the same specimen likewise show an apparent similarity in outline and proportions to that of the Arizona mummy.

There seems thus to be no doubt that *Pachycyon robustus* is after all only a breed of dog cultivated by the Indians of the southern parts of North America and of Peru. It is therefore no longer to be thought of as a problematical mammal of the Pleistocene.

Among the dog-bones obtained by the University of California's investigations of the Indian shell-mounds on San Nicolas Island, off the coast of southern California, are two crania nearly identical in

measurements with the Marsh Pass specimen that appear to represent this same small, short-nosed dog. They are characterized by their broad brain-cases, spreading zygomata, wide palates, shortened rostra, and small teeth. In profile the dorsal outline of the brain-case is gently rounded, not fiat. The shortness of the rostrum does not amount to real deformity however, for the lower jaw closes normally into its place and the premolars are not markedly crowded, though p^4 is turned at an angle of nearly 50° from the axis of the skull to adapt its position to the sudden narrowing of the skull at this point. Premolars 1 and 2 are normal in position, and there is a short diastema between p^4 and the canine. The ossification seems particularly heavy, yet though old, neither skull has developed a sagittal crest except at the interparietal region. In the dried mummy from Marsh Pass, the shortened nose and elevated forehead give a characteristic appearance to the head which is evident in these crania as well. No liml)-bones that can be assigned to this dog, ha\"e appeared among the Calif ornian collections. In both crania the opening of the posterior nares is narrow, and a transverse line drawn at right angles to the cranial axis at the posterior end of the palate falls behind the last molar, iuficating deviation from the normal condition.

The following skull-measurements show close agreement. One of the Calif ornian crania (r^4is^4) lacks any trace of the alveoli of ?»- which are partly broken and partly resorbed. The first premolar is wanting also. The proportions of the maxilla are, however, practically the same in both specimens. The Ancon specimen is figured by Nehring (IS84b) of natural size and the measurements are taken from this figure. It too lacks the first upper premolar, and in every

respect conformation to the appearance of the other crania.

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Measurements of the Skull

1

16,356

Calif.

Greatest length, occiput to median incisor

(alveolus)

Greatest length, edge of foramen magnum to

median incisor

Median incisor to edge of palate

" " " orbit (anterior edge)

" " (alveolus)

Canine " m^ "

Premolars "" (alveoli)

Length of premolar ^

Molars '~-' (alveoli)

Width of palate outside m.^

a n (1 u ,_:i

Zygomatic width

Mastoid width

Width of occipital condyles

Nasals, length

138

121

68

54

17

56.5

39

85

53

31

41

In addition to the limb-measurements given on p. 497, the Arizona mummy gives the following: — total length from tip of nose to tip of tail following curve of back, 705 (circa); tail about 195; ulna 120 (circa); carpus to end of longest claw 90; ear about 60-70 mm. long including hair; tail 195; femur 106 (circa); tibia 116 (circa); hind foot 122.

Remarks. — Although this type of dog seems to have been widespread among the aborigines of southern North America and northeastern South America, it appears to have quite disappeared and is not clearly identifiable in any of the accounts of the early writers.

Mr. Guernsey's discovery of a well-preserved mummy in a burial of considerable age in Arizona, has confirmed my previous identification of the Virginia bones of *Pachycyon* with those of Nehring's short-limbed dog-mummy of Ancon. The cranium is characterized by its

breadth and stoutness, its shortened snout and high forehead, gently convex dorsal profile of the brain-case, and the small teeth (upper carnassial 16-17 mm.). The Californian crania agree substantially in every detail. Probably this is the same dog that Moore (1907, p. 423) discovered in Indian mounds on Crystal River, west Florida, of which Lucas observed, "the front of cranium of carnivore and jaws,

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are from the same animal, the short-faced dog something like a bull-terrier that seems to have been a favorite with the Indians of the southwest".

Peruvian Pug-nosed Dog.

Plate 12.

1885. *Canis ingae molossoides* Nehring, Sitzb. Gesellsch. naturf. freunde Berlin, p. 5-13.

Characters. — Similar to the Short-nosed Indian Dog but with even shorter facial bones, an undershot lower jaw, broader zygomata and posterior nasal passage. The increased shortening of the face causes a slightly more elevated forehead. The color seems to have been yellowish or whitish, marked or clouded with dark brown.

Distribution. — This Dog is known only from the Peruvian High-lands, where its remains have been found with ancient burials of the aborigines at Ancon and Pachacamac.

Skull-Characters. — A comparison of six skulls from Peru (loaned by the U. S. N. M.) with those of the Short-nosed Dog of North America, leaves little doubt that the Peruvian Pug-nosed Dog is derived from the latter, perhaps through some sort of cross-breeding, possibly as an occasional result of a particular cross, or through the dominance of its peculiarities in cross-bred animals. In most respects, the skulls of both are essentially alike, but the shortening of the rostral portion in the present breed is more pronounced, resulting in an undershot lower jaw. Yet the reduction of the maxillaries is not so extreme as to cause very great crowding of the premolars as in our Bull-dogs or the Pekinese Lap-dogs. Thus in two out of six crania, the third premolar is set almost transversely to the long axis of the skull, but in the others it retains about the usual relation. The second premolar, in two cases, is turned inward at more than the usual angle. In only one of the six skulls is the first upper premolar missing, and here on the left side only'.

The opening of the posterior nares is, very wide in comparison with the common Short-nosed Dog, and the zygomatic arches are broader. In none of the six skulls do the temporal ridges unite to form a median crest except at the occiput along the interparietal bone. On account of the shortening of the facial bones, the forehead is high, with a deep and broad groove medially. A further result of this shortening is the greater upward turn of the palate, best seen when the crania are

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on a flat surface. The palate of the Pug-nosed Dog, makes an angle with the table of about 27° against about 15° in the case of the longer-nosed breed. The same rugose surface of the brain-case, the lieaviness of bone and the thickened prominc/twes at each side of the posterior narial openings, characteristic of the Inca Dog, are seen in this breed as well.

No Hmb-bones have been obtained that can be referred to this dog, but it is Hkelv that thev were short and thick hke those of the related breed.

The following table gives dimensions of the sL\ skulls in the U. S. N. M. and is interesting for comparison with those of the Short-nosed Indian Dog.

Remarks. — ^The existence of this breed of aboriginal dogs with shortened face and undershot, bull-dog-like jaw, was first discovered by Reiss and Stiibel in the course of their investigation of the necropolis of Ancon, Peru. Nehring (1885) published an account of their discovery and gave the Latin name *Canis ingae molossoides* to the

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lyreid. At first but a single specimen was found among numerous other dog remains, but further search brought a few more to light, and more recently the Yale-National Geographic Society Expedition has recovered several skulls, from Huacho and Pachacamac.

The presence of this pug-nosed dog* among the ancient Peruvians is doubly interesting, not only in that this variation should have occurred here, apparently quite independent of similar cases in the Old World, but in that it should have been preserved, whether through accident, or as supposed, through purposeful selection. Such a shortening of the face through the imperfect development of the bones of the rostrum is found occasionally in other domesticated mammals. The short-faced Cheshire Hogs and similar lyreids furnish like instances of the selection and preservation of this mutation, which appears to be definitely heritable. Among undomesticated species, the case of a European Fox is recorded by Donitz (1869) in which the rostrum was shortened abnormally, producing a bull-dog-like appearance, with undershot jaw. The second and third premolars of the upper jaw were opposite the third and fourth respectively of the lower jaw, while the upper canine fitted into a space between the first and second lower premolars. Schmitt (1903) agrees with Studer (1901) that such cases are due to the retention of embryonic conditions but considers them to be a result of domestication. This, however, is not necessarily the case, as the above instance shows. The case of a

"bull-dog-headed calf" is recorded by Warren (1910) as having appeared as a "sport" variation.

Notwithstanding the comparatively high cultural development of the Incas, it may be doubted whether they purposely bred these dogs for their peculiarity of face. Quite as likely the anomaly arose, perhaps as a frequent result of cross-breeding between certain of the other canine races, or as a local abnormality, which as a Mendelian character, frequently cropped out in chance crosses. This may be indicated by the apparent rarity of this type of dog in the Ancon burials, and by the considerable variation in slight details of the form of the skull, as if no special type were bred for.

An interesting anomaly of an opposite nature is worth recording in this connection, namely that of a Jackal shot by Dr. J. C. Phillips in Arabia (M. C. Z. 15,872) in which the wider jaw has failed to reach its normal length and is overshot by the upper jaw. The lower canine closes behind the upper instead of anterior to it as in normal cases.

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Summary.

Recent careful studies of the teeth indicate that the domestic dog's relationship is with the wolves rather than with the groups of canids represented by coyote, jackal, or fox. The ultimate wolf-like ancestor

of the dog is yet to be determined, but present evidence favors the view that it was not one of the large circumboreal wolves, but possibly a distinct and smaller species, from which both large and small breeds of dogs have been derived. -

The domestic dogs of the American aborigines were quite as truly typical dogs as those of Asia, and may be assumed to have reached America from that continent, with their human companions. Although it is possible that the larger dogs may interbreed occasionally with wolf or coyote, there is no good reason to suppose that such crossing has had much if any, influence on the original stock.

In a very general way, three types of dogs may be distinguished among the American aborigines: (1) the large, broad-muzzled, Eskimo Dog, with heavy coat and tail curled forward over the hip; (2) a larger and (3) a smaller Indian Dog, from which are probably to be derived several distinct local breeds. Of the larger style of dog as many as eleven varieties may perhaps be distinguished: of the smaller, five.

An interesting and suggestive parallel is found among prehistoric European dogs, of which in late Neolithic and early Bronze periods there were a large and a small type — *Canis intermedius* and *C. palustris* — corresponding rather closely to the Larger or Common Indian Dog and the Small Indian Dog or Techichi. The obvious probability is that these two general types of dogs were then widely cultivated in Asia, and at a very early period reached Europe and America with the human immigrants. In a similar way the Eskimo Dog is of a type common to northern Asia and Europe, and doubtless

reached America with the Eskimos, whose arrival, at least in eastern America is usually regarded as relatively recent.

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EXPLANATION OF PLATES.

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PLATE 1.

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Allen. — Dogs of the American Aborigines.

PLATE 1.

Fig. 1. — Eskimo Dog. The grandparents of this dog were brought by Peary from Smith's Sound,. Greenland. Photo by Ernest Harold Baynes.

Fig. 2. — The Hare-Indian Dog of northern Mackenzie. From Richardson's plate (1829).

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BULL. MUS.COMP. ZOOL.

Allen. Dogs. Plate 1

[Begin Page: Title, Plate 2]

PLATE 2.

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Allkn . — Dogs of the American Aborigines.

PLATE 2.

Fig. 1. — Mexican Hairless Dog. Reproduction of figure of *Lupus vjexicanus* from Recchi and Lynceus (1651).

Fig. 2. — Mexican Hairless Dog, 9 . Photograph by Arthur Stockdale of Mexico City. Courtesy of The Journal of Heredity.

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BULL. MUS.COMP. 200L.

Allen. Dogs. Plate 2

[Begin Page: Title, Plate 3]

PLATE 3.

[Begin Page: Descr. of Plate 3]

Ai,t.EN. — Dogs of (he American Aborigines.

PLATE 3.

Fig. 1. — The Ytzcuinteporzotli or *Canis mexicana* of Hernandez, reproduced from the figure by Reechi and Lynceus (1651) . It probably represents a Raccoon.

Fig 2. — On the right a Mexican Hairless Dog, on the left a hairy dog from the same litter. The parents of these two were a Mexican Hairless Dog shown in Plate 2, fig. 2, and a mongrel dog, normally haired. Courtesy of the Journal of Heredity.

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BULL. MUS.COMP.ZOOL.

Allen. Dogs. Plate 3

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PLATE 4.

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AiXEN'.- — Dogs of the American Aborigines.

PLAICE 4.

Fig. 1. — Clallam-Indian Dog. From the painting by Paul Kane in 1846,
now in the Royal Ontario Museum of Archaeology at Toronto.

Fig. 2. — Fuegian Dog. Reproduction of d'Herculais' (1884) figure drawn
from a dog brought to France from Tierra del Fuego by the Mission
Scientifique du Cap Horn.

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BULL. MUS. COMP. ZOOL.

Allen. Dogs. Plate 4

[Begin Page: Title, Plate 5]

PLATE 5.

[Begin Page: Descr. of Plate 5]

Allen. — Dogs of Illo American Aborigines.

PLATE 5.

Fig. 1. — A dog of the Bersimis Indians, Canada, supposed to represent the
Short-legged Indian Dog. Photograph by William B. Cabot.

Fig. 2.- — Small yellow-and-white or brindle dogs, with a child of the Macusi Indians in southern British Guiana. These dogs may have more or less blood of European stock, but probably retain some aboriginal characteristics. Photograph by Dr. William C. Farrabee.

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BULL. MUS. COMP. ZOOL.

Allen. Dogs. Plate 5

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[Begin Page: Title, Plate 6]

PLATE 6.

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Allen. — Dogs of the American Aborigines.

PLATE 6.

The Short-nosed Indian Dog ("Pachycyon"). A mummified specimen col-

lected by Messrs. S. J. Guernsey and A. V. Kidder in the Marsh Pass region, Arizona, and now in the Peabody Museum of Archaeology. Photograph by S. J. Guernsey.

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BULL. MUS. COMP. 200L.

Allen. Dogs. Plate

[Begin Page: Title, Plate 7]

PLATE 7.

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Allen. — Dogs of the American Aborigines.

PLATE 7.

Skull of the Common Indian Dog, collected by Kennicott on Peel River, northern Mackenzie, U. S. N. M. 6,219. Length 177 mm.

Fig. 1. — Cranium in profile showing relatively weak crests and slender muzzle.

Fig. 2. — Lower ramus; the first premolar normally lacking.

Fig. 3. — Cranium, ventral view; upper first premolar lacking.

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BULL. MUS. COMP. ZOOL.

Allen. Dogs. Plate 7

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PLATE 8.

[Begin Page: Descr. of Plate 8]

Allen. — Dogs of the American Aborigines.

PLATE 8.

Cranium of the Common Indian Dog from Le Moine shell-heap, French-
man's Bay, Maine, collection of Phillips Academy, Andover, Mass., 53,902 Me.

Length 192 mm.

Fig. 1.— Profile view.

Fig. 2. — Ventral view. The first upper premolar is lacking.

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BULL. MUS. COMP. ZOOL.

Allen. Dogs. Plate 8

[Begin Page: Title, Plate 9]

PLATE 9.

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Allen. — Dogs of the American Aborigines.

PLATE 9.

Cranium of an Inca Dog, collected by Dr. A. Hrdlička at Huacho, Peru,
U. S. N. M. 176,309. Length, occiput to anterior root of incisors, 178 mm.

Fig. 1.— Profile.

Fig. 2. — Ventral view. The first premolar is present on the left side only.

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BULL. MUS.COMP.ZOOL.

Allen. Dogs. Plate 9

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[Begin Page: Title, Plate 10]

PLATE 10.

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PLATE 10.

Small Indian Dog or Techichi, from a cranium collected by L. F. Carr, in Ely Cave, Lee County, Virginia, M. C. Z. 7,123. Length, occiput to tip of premaxillaries, 140 mm.

Fig. 1.— Profile.

Fig. 2. — Ventral view.

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BULL. MUS. COMP. ZOOL.

Allen. Dogs. Plate 10

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PLATE II.

[Begin Page: Descr. of Plate 11]

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PLATE 11.

Cranium of a Short-nosed Indian Dog ("Pachycyon") from shell-mound
on San Nicolas Island, off southern California, Univ. of Cal., Anthropol. Mus.,
T^W. Length, occiput to tip of premaxillary, 138 mm.

Fig. 1.— Profile.

Fig. 2. — Ventral view.

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BULL. MUS. COMP. ZOOL.

Allen. Dogs. Plate 11

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PLATE 12.

[Begin Page: Descr. of Plate 12]

Allen. — Dogs of the American Aborigines.

PLATE 12.

Skull of the Peruvian Pug-nosed Dog, collected by Dr. A. Hrdlicka at Huacho, Peru, U. S. N. M. 176,307. Length of cranium, occiput to tip of premaxillaries, 147 mm.

Fig. 1. — Profile, showing undershot jaw.

Fig. 2. — Cranium, ventral view.

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BULL. MUS. COMP.200L.

Allen. Dogs. Plate 12

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